

30 DEC 1998

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METHOD OF PRODUCING A CERAMIC ELECTRONIC PART ✓

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method of producing a ceramic electronic part using a ceramic sintered body with an internal electrode, such as a layered capacitor, and more particularly to a method of producing a ceramic electronic part in which the polishing step carried out to expose the internal electrode from an outside surface of the ceramic sintered body is improved.

2. Description of the Related Art

When producing a ceramic electronic part including an internal electrode, such as a layered capacitor, it is necessary that the internal electrode be reliably electrically connected to an external electrode at the final stage. Ordinarily, a ceramic sintered body is obtained by forming an unsintered ceramic layered body, formed by placing unsintered ceramics upon each other through an internal electrode, and firing the unsintered ceramic layered body. However, in the ceramic sintered body formed in the above-described way, the contraction rates of the internal electrode and the ceramics during the firing are different, so that the internal electrode may not get

exposed from the outside surface of the ceramic sintered body. This is illustrated in Figs. 10 and 11.

Fig. 10 is a vertical sectional view of a ceramic sintered body used in a layered capacitor. A plurality of internal electrodes 52a to 52f are formed in the ceramic sintered body 51. In the layered capacitor, external electrodes are formed at end surfaces 51a and 51b of the ceramic sintered body 51 by a later step. Therefore, it is necessary that the internal electrodes 52a, 52c, and 52e be reliably exposed from the end surface 51a, and the internal electrodes 52b, 52d, and 52f be reliably exposed from the end surface 51b.

However, since, in the obtained ceramic sintered body 51, the contraction rates of the ceramics and the internal electrode material are different as mentioned above, the internal electrode 52a is often disposed inward from the end surface 51a, as shown clearly in Fig. 11 that is an enlarged view of the portion enclosed by circle A in Fig. 10. More specifically, the internal electrodes 52a to 52f are disposed inward from the end surface 51a or 51b after the firing, and are thus often not exposed from the end surface 51a or 51b.

Therefore, conventionally, in order to expose the internal electrodes 52a to 52f, a wet-polishing method is used to polish the aforementioned ceramic sintered body 51

that has been obtained. More specifically, a plurality of the sintered bodies 51, an abrasive, and water are put into a barrel, and the barrel is rotated in order to polish the ceramic sintered bodies 51, thereby exposing the internal electrodes 52a to 52f from the end surface 51a or 51b.

The wet-barrel polishing method using water is used to prevent the problem of cracking in the ceramic sintered bodies 51 caused by collisions of the ceramic sintered bodies 51 with each other and collisions of the abrasive and the ceramic sintered bodies 51 with each other. In other words, water is used as a shock-absorbing material to reduce impact force.

In addition to the above-described wet-barrel polishing method, a sandblast method is used to polish the end surfaces 51a and 51b of the ceramic sintered bodies 51. In the sandblast method, the ceramic sintered bodies 51 are held by a holder having a plurality of holes arranged in a row, and the end surfaces 51a and 51b being exposed are subjected to sandblasting.

The above-described wet-barrel polishing method allows the internal electrodes 52a to 52f to be reliably exposed from the end surface 51a or 51b of the ceramic sintered bodies 51, but has the problem of water flowing into the ceramic sintered bodies 51 because water is used as a shock-absorbing material. More specifically, the water used as

the shock-absorbing material tends to move in through the interfaces between the internal electrodes 52a to 52f and the ceramics. This water cannot be easily removed from the ceramic sintered bodies 51, and reacts during firing of the external electrodes carried out later, thereby accelerating peeling at the interfaces between the ceramics and the internal electrodes 52a to 52f.

When the conventional wet-barrel polishing method using water is used, interlayer peeling, called delamination, tends to occur in the layered capacitors obtained at the final stage, thereby reducing insulation resistance and the rate at which properly produced layered capacitors is obtained.

On the other hand, when the above-described sandblast method is used, water is not required because polishing is carried out by directly ejecting an abrasive onto the end surfaces 51a and 51b of the ceramic sintered bodies. However, it is necessary to carry out the troublesome step of holding the plurality of ceramic sintered bodies by a holder, thereby preventing a large number of ceramic sintered bodies to be produced efficiently.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a highly productive ceramic electronic part

producing method which allows an internal electrode to be reliably exposed from an end surface of a ceramic sintered body by dry-barrel polishing that does not use water, so that delamination and deterioration in electrical properties do not easily occur, and so that the end surface of the ceramic sintered body can be efficiently polished.

To this end, according to the present invention, there is provided a method of producing a ceramic electronic part including an internal electrode in a ceramic sintered body and an external electrode electrically connected to the internal electrode at an outside surface of the ceramic sintered body, the method comprising the steps of:

obtaining the ceramic sintered body including the internal electrode; and

exposing the internal electrode from the outside surface of the ceramic sintered body by subjecting the ceramic sintered body to dry-type barrel polishing.

Although not exclusive, when the dry-type barrel polishing is carried out, a dry-type centrifugal barrel device may be used, the dry-type centrifugal barrel device including a rotary plate that rotates around a rotary shaft as a center; a first drive source, connected to the rotary plate, for rotationally driving the rotary plate; a barrel pot connected to the rotary plate so as to rotate along with the rotary plate around the rotary shaft of the rotary plate

and independently of the rotary plate, the barrel plate accommodating the ceramic sintered body therein; and a second drive source, connected to the barrel pot, for rotationally driving the barrel pot;

wherein only the ceramic sintered body may be put into the barrel pot, and the rotary plate and the barrel pot may be rotated. ✓

Although not exclusive, when the dry-type barrel polishing is carried out, a barrel-type blast device may be used, the barrel-type blast device including a barrel pot constructed so as to rotate around a rotary shaft as a center, the barrel pot having an opening; a blast nozzle for ejecting therefrom an abrasive towards the opening in the barrel pot; and a drive source, connected to the barrel pot, for rotationally driving the barrel pot;

wherein a plurality of the ceramic sintered bodies may be put into the barrel pot, and as the barrel pot is rotated, the abrasive may be ejected from the blast nozzle to carry out the dry-type barrel polishing.

Although not exclusive, at least a portion of the barrel pot may be formed of meshes or of a member with many holes.

Although not exclusive, the step of obtaining the ceramic sintered body may include the stage of obtaining an unsintered ceramic layered body, and the stage of rounding a

corner of the unsintered layered body by subjecting the unsintered ceramic layered body to the barrel polishing.

Although not exclusive, in the stage of subjecting the unsintered ceramic layered body to the barrel polishing, a dry-type centrifugal device may be used, the dry-type centrifugal device including a first drive source, connected to a rotary plate, for rotationally driving the rotary plate; a barrel pot connected to the rotary plate so as to rotate along with the rotary plate around a rotary shaft of the rotary plate and independently of the rotary plate, the barrel plate accommodating the ceramic sintered body therein; and a second drive source, connected to the barrel pot, for rotationally driving the barrel pot.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic front view of a centrifugal barrel device used in an embodiment of the present invention.

Fig. 2 is a front view of the centrifugal barrel device of Fig. 1.

Fig. 3 is a sectional view of the portion taken along line B-B of Fig. 2.

Fig. 4 is a perspective view of a barrel pot used in the centrifugal barrel device.

Fig. 5 is a vertical sectional view showing a state in which ceramic sintered bodies are put in the barrel pot.

Fig. 6 is a vertical sectional view of a ceramic sintered body provided in the first embodiment.

Fig. 7 is a vertical sectional view of a layered capacitor obtained in the first embodiment.

Fig. 8 is a partial cutaway side view used to illustrate a barrel-type blast device used in a second embodiment.

Fig. 9 is a perspective view of a barrel pot used in the second embodiment.

Fig. 10 is a vertical sectional view of a sintered body, used to illustrate a conventional method of producing a layered capacitor.

Fig. 11 is a partial sectional view illustrating in enlarged form the portion enclosed by circle A of Fig. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A detailed description will now be given of specific embodiments of the present invention with reference to the drawings.

(First embodiment)

In the first embodiment, layered capacitors whose dimensions are 2.0 mm x 1.2 mm x 1.2 mm and whose capacitance is 1 μ F are produced in the following way.

Internal electrodes are printed on ceramic green sheets, and the ceramic green sheets that have been subjected to the

printing are placed upon each other. Then, plain ceramic green sheets are placed on the top and the bottom in order to form a mother ceramic layered body. The mother ceramic layered body is pressed in a direction of thickness thereof, and then cut in the direction of thickness in order to form unsintered ceramic bodies based on individual layered capacitors to be formed.

By a centrifugal barrel polishing device described with reference to Figs. 1 to 5, the unsintered ceramic layered bodies are polished in order to round the corners of the unsintered ceramic layered bodies. The step of rounding the corners is primarily carried out to remove burrs from the unsintered ceramic layered bodies so that, for example, the corners after sintering have a radius of curvature of 70 μm .

Fig. 2 is a front view of a centrifugal barrel polishing device. The centrifugal barrel polishing device, represented by reference numeral 1, comprises a pair of rotary plates 2 and 3. In Fig. 2, only the front rotary plate 2 is shown. Fig. 1 is a schematic front view showing a state after removal of the front rotary 2, and illustrates the back rotary plate 3. The rotary plates 2 and 3 are coupled by a rotary shaft 4. The rotary shaft 4 is connected to a rotational drive source M schematically shown in Fig. 2. The rotational drive source M is a suitable rotational drive device such as a motor.

The rotary plates 2 and 3 are constructed so that they rotate around the rotary shaft 4 as a center.

A plurality of barrel pots 5 to 8 are disposed between the rotary plates 2 and 3. Taking the barrel pot 5 as an example, the structures of the barrel pots 5 to 8 will be described with reference to Figs. 3 and 4.

As shown in Fig. 4, the barrel pot 5 has an octagonal tube-like shape. It is formed of meshes containing a plurality of through holes, the meshes being schematically shown by hatching in Fig. 4. Instead of being formed of meshes, they may also be formed by a member having many through holes. It is not necessary for the entire pot 5 to be formed of meshes or a member having many holes.

Rotary shafts 5c and 5d are mounted to end surfaces 5a and 5b of the barrel pot 5 so as to extend outward in lengthwise directions of the barrel pot 5.

The rotary shafts 5c and 5d are disposed concentrically.

As shown in Fig. 3, the rotary shafts 5c and 5d are inserted in through holes 2a and 3a in the rotary plates 2 and 3. In this way, the barrel pot 5 is mounted to the rotary plates 2 and 3 so that it can rotate independently of the rotary plates 2 and 3. A gear 9 is mounted to an outer end of the rotary shaft 5c. The gear 9 is connected to a rotational drive source 10 shown schematically in Fig. 3. The rotational drive source 10 is a suitable drive device,

such as a motor, that provides rotational drive force. Driving the rotational drive source 10 rotates the gear 9, and the rotation of the gear 9 rotates the barrel pot 5 independently of the rotary plates 2 and 3.

The other barrel pots 6 to 8 have structures similar to the structure of the above-described barrel pot 5.

Portions of the barrel pots 5 to 8 can be covered and uncovered, so that they are constructed to allow ceramic layered bodies to be put therein. In the embodiment, an end surface 5a side of the barrel pot 5 is constructed so that it can be covered and uncovered with respect to a cylindrical body 5e.

The aforementioned unsintered ceramic layered bodies are put into the barrel pots 5 to 8 and subjected to barrel polishing to round the corners of the unsintered ceramic layered bodies to the aforementioned extent during one rotation of the barrel pots 5 to 8, with the rotation speed of the barrel pots being 150 rpm, and the rotation speed of the rotary plates 2 and 3 being 150 rpm.

Here, as the rotary plates 2 and 3 rotate, the unsintered ceramic layered bodies move while being pushed against the outer surface of each of the barrel pots 5 to 8 in diametrical directions of the rotary plates 2 and 3 as a result of centrifugal force, as shown in Fig. 1. More specifically, as is clear from the hatched areas represented

by letters X, during the rotation of the rotary plate 3 in the direction of arrow Y, the ceramic layered bodies to be subjected to polishing that are put in the barrel pots 5 to 8 move while being pushed against the outer surfaces of the barrel pots 5 to 8 in the diametrical directions of the rotary plates 2 and 3. During one rotation of the rotary plates 2 and 3, the barrel pots 5 to 8 themselves rotate once in the direction of arrow Z, that is, in the same direction as the rotary plate 2. Accordingly, the ceramic layered body aggregates indicated by the letters X are subjected to the above-described polishing as a result of moving along the inside surface of each of the barrel pots 5 to 8 in a circle once.

Then, the ceramic layered bodies whose corners have been rounded in the above-described manner are subjected to firing, whereby ceramic sintered bodies are formed. Using the centrifugal barrel polishing device 1 again, the ceramic sintered bodies obtained in the above-described manner are polished. In this case, the ceramic sintered bodies are put into the barrel pots 5 to 8 and polished for 60 minutes, with the rotation speed of the rotary plates 2 and 3 being 150 rpm and the rotation speed of the barrel pots 5 to 8 being 1/60 rpm. More specifically, during the 60-minute polishing, the rotary plates 2 and 3 as well as the barrel pots 5 to 8 rotate once. In this case too, during the

rotation of the rotary plate 3 in the direction of arrow Y, the ceramic layered bodies to be polished that have been put in the barrel pots 5 to 8 move while being pushed against the outer surfaces of the barrel pots 5 to 8 in the diametrical directions of the rotary plates 2 and 3. During one rotation of the rotary plates 2 and 3, the ceramic layered body aggregates represented by the letters X move along the inside surface of each of the barrel pots 5 to 8 in a circle once, whereby they are polished.

A ceramic sintered body 11 shown in Fig. 6 is obtained by the above-described polishing. In the ceramic sintered body 11, internal electrodes 12a to 12f are disposed in the ceramic layers so as to overlap each other in a direction of thickness thereof. The internal electrodes 12a, 12c, and 12e are exposed from the end surface 11a, while the internal electrodes 12b, 12d, and 12f are exposed from the end surface 11b. The states of exposure were observed with an electron microscope. In other words, the end surfaces 11a and 11b of the ceramic sintered body 11 were observed with a transmissive electronic microscope. The observations confirmed that the internal electrodes 12a to 12f were completely exposed from the end surface 11a or 11b.

After the polishing of the ceramic sintered body 11, external electrodes 13 and 14 are formed on the end surfaces 11a and 11b of the ceramic sintered body 11 to form a

layered capacitor 15, as shown in Fig. 7. The layered capacitor obtained in this way is cut to observe the state of connection of the external electrodes 13 and 14 and the internal electrodes 12a to 12f with the electron microscope. The observations showed that the external electrodes 13 and 14 and the internal electrodes 12a to 12f were reliably connected as a result of alloying in the external electrodes 13 and 14 and the internal electrodes 12a to 12f caused by mutual scattering.

At a temperature of 85°C and a relative humidity of 85%, a voltage of 1 WV was applied to layered capacitors obtained in the above-described way for 1000 hours. The insulation resistance was measured before and after the application of the voltage, with a product being considered defective when the insulation resistance was reduced to $10^6 \Omega$ or less. The results of the measurements showed that there was no deterioration in the insulation resistance property of 100 layered capacitors.

In the method of producing a layered capacitor in the above-described embodiment, the dry-type centrifugal barrel device 1 is used to round the corners of the unsintered ceramic bodies, and the end surfaces of the obtained ceramic sintered bodies are polished, so that the internal electrodes are reliably exposed from the end surfaces of the ceramic sintered bodies. Thus, the internal electrodes and

the external electrodes can be more reliably connected together, and the insulation resistance property is not easily deteriorated because water is not used for the polishing. Further, many sintered ceramic bodies can be obtained at one time because many ceramic sintered bodies can be polished by putting them into the plurality of barrel pots 5 to 8.

(Second embodiment)

In the second embodiment layered capacitors whose dimensions are 2.0 mm x 1.2 mm x 1.2 mm and whose capacitance is 1 μ F are also produced.

Similarly to the first embodiment, in the second embodiment, unsintered ceramic layered bodies are obtained and polished with the centrifugal barrel device 1 so that their corners are rounded. Then, similarly to the first embodiment, they are subjected to firing to obtain ceramic sintered bodies.

In the second embodiment, the ceramic sintered bodies obtained in the above-described way are polished using a barrel-type blast device. The barrel-type blast device is described with reference to Figs. 8 and 9.

As shown in Fig. 8, in the barrel-type blast device 21, a barrel pot 22 with an opening 22a is used. The barrel pot 22 is shown in perspective in Fig. 9. The opening 22a is formed in the top of the barrel pot 22. The barrel pot 22

has a form in which two side surfaces or truncated-cone-shaped curved portions 22b and 22c are connected together. In other words, it has a form in which its diameter being largest at the center thereof becomes smaller towards the top and bottom with increasing distance from the largest-diameter portion. A rotary shaft 23 is connected to a bottom portion 22d of the barrel pot 22. The rotary shaft 23 is connected to a rotational drive source 24. The rotational drive source 24 is a suitable rotational drive mechanism, such as a motor. Accordingly, the barrel pot 22 can rotate around the rotary shaft 23 as a center.

As shown in Fig. 8, a blast nozzle 25 is disposed forwardly of the opening 22a. The blast nozzle 25 is constructed so as to eject an abrasive into the barrel pot 22 from the opening 22a. In the embodiment, the abrasive is ejected from the blast nozzle 25 not in a direction parallel to the rotary shaft 23, but in a direction intersecting the rotary shaft 23. As shown in Fig. 8, the rotary shaft 23 is tilted so that its construction is such as to allow the ceramic sintered bodies 11 put into the barrel pot 22 to accumulate on the side surface 22c side of the barrel pot 22. The abrasive is ejected from the blast nozzle 25 towards the accumulated ceramic sintered bodies 11.

The entire barrel pot 22 is formed of meshes, as shown schematically in Figs. 8 and 9. Naturally, the barrel pot

22 may be formed of a member with many through holes, or partly formed of meshes or a member with many through holes.

Many ceramic sintered bodies 11 are put into the barrel pot 22 of the barrel-type blast device 21 from the opening 22a side. Rotating the barrel pot 22 at a speed of 5 rpm, #100-mesh zirconia powder used as the abrasive is ejected from the blast nozzle 25 under a pressure of 0.1 MPa for 15 minutes and the rotation of the barrel pot 22 is continued in order to carry out blast-type barrel polishing. In this case, the barrel pot 22 is formed of meshes, so that the abrasive and the dross resulting from the polishing are discharged out of the barrel pot 22 by the rotation thereof.

As in the first embodiment, a confirmation was made using an electronic microscope as to whether or not the internal electrodes 12a to 12f were exposed from the end surfaces 11a and 11b of the ceramic sintered bodies obtained in the above-described way. The results of the confirmation showed that the internal electrodes 12a to 12f were reliably exposed from the end surface 11a or 11b.

As in the first embodiment, layered capacitors were obtained using the ceramic sintered bodies obtained in the above-described way.

As in the first embodiment, the connection states of the external electrodes and the internal electrodes of the layered capacitors obtained in the above-described way were

observed. The observations showed that they were reliably connected due to complete alloying in the external electrodes and the internal electrodes resulting from mutual scattering.

As in the first embodiment, no deterioration in the insulation resistance property of 100 layered capacitors was observed after evaluating the weatherproofness thereof.

Therefore, in the second embodiment too, by polishing the ceramic sintered bodies with the barrel-type blast device 21, the internal electrodes 12a to 12f can be reliably exposed from the end surface 11a or 11b of the ceramic sintered bodies, and the external electrodes and the internal electrodes can be reliably electrically connected together. Further, no deterioration in the insulation resistance property was observed because the polishing was carried out by a barrel-type blast device that does not use water.

In the second embodiment too, many ceramic sintered bodies can be polished at one time because many ceramic sintered bodies can be put into the barrel pot 22 and polished.

Although in the first and second embodiments layered capacitors are produced, the ceramic electronic part producing method of the present invention can also be used to produce other types of ceramic layered electronic parts,

such as layered inductors or layered varistors; or to produce ceramic electronic parts with only one internal electrode.

In the present invention, when polishing is carried out with the above-described barrel-type blast device, alumina powder or the like may be used as the abrasive, instead of zirconia powder.

According to the ceramic electronic part producing method of the present invention, the ceramic sintered bodies are polished by the dry-type barrel polishing method that does not use water in order to expose the internal electrodes from the outside surfaces of the ceramic sintered bodies. Therefore, the problems of delamination and deterioration in electrical properties, such as insulation resistance property, caused by moisture flowing in from the interfaces between the external electrodes and the ceramics, seldom occur. Therefore, it is possible to provide highly reliable ceramic electronic parts.

In addition, since the dry-type barrel polishing method is used, many ceramic sintered bodies can be processed at one time, making it possible to produce a larger number of ceramic electronic parts.

In the present invention, when the above-described centrifugal barrel device is used to carry out the above-described dry-type barrel polishing, many ceramic sintered

bodies can be put into barrel pots to subject them to the dry-type barrel polishing. Therefore, many ceramic sintered bodies can be easily polished by simply putting them into the barrel pots and driving the centrifugal barrel device. Consequently, an even larger number of ceramic electronic parts can be produced.

In the present invention, when the above-described barrel-type blast device is used to carry out the dry-type barrel polishing, the end surfaces of the ceramic sintered bodies can be easily and reliably polished by simply putting the ceramic sintered bodies into a barrel pot and ejecting an abrasive from a blast nozzle. In this case, the internal electrodes are reliably exposed from the end surfaces of the ceramic sintered bodies, and many ceramic sintered bodies can be processed at one time, so that it is possible to produce highly reliably ceramic electronic parts efficiently.

In the present invention, when the barrel pot or pots are constructed so that at least a portion or portions thereof are formed of meshes or a member or members with many holes, the abrasive or the drools resulting from the polishing can be quickly discharged out of the barrel pot or pots from the meshes or the many holes.

In the present invention, when the step of obtaining ceramic sintered bodies is carried out by subjecting unsintered ceramic layered bodies to dry-type barrel

polishing in order to round the corners of the unsintered layered bodies, the external electrodes are reliably formed to a sufficient thickness even at the corners. Therefore, when a ceramic electronic part is mounted onto, for example, a printed circuit board, the problem of breakage of parts of wires connected to the external electrodes seldom occurs. In addition, since water is not used in the barrel polishing, the problems of deterioration in electrical properties, such as insulation resistance property, or interlayer peeling, called delamination, seldom occur in the ceramic electronic parts obtained at the final stage.

When the above-described centrifugal barrel device is used to subject unsintered ceramic layered bodies to the dry-type barrel polishing, many ceramic layered bodies can be put into and processed in barrel pots, making it possible to provide highly reliable ceramic electronic parts without reducing the number of ceramic electronic parts that can be produced.



WHAT IS CLAIMED IS:

1. A method of producing a ceramic electronic part including an internal electrode in a ceramic sintered body and an external electrode electrically connected to the internal electrode at an outside surface of the ceramic sintered body, the method comprising the steps of:

obtaining the ceramic sintered body including the internal electrode; and

exposing the internal electrode from the outside surface of the ceramic sintered body by subjecting the ceramic sintered body to dry-type barrel polishing.

2. A method of producing a ceramic electronic part according to Claim 1, wherein when the dry-type barrel polishing is carried out, a dry-type centrifugal barrel device is used, the dry-type centrifugal barrel device including a rotary plate that rotates around a rotary shaft as a center; a first drive source, connected to the rotary plate, for rotationally driving the rotary plate; a barrel pot connected to the rotary plate so as to rotate along with the rotary plate around the rotary shaft of the rotary plate and independently of the rotary plate, the barrel plate accommodating the ceramic sintered body therein; and a second drive source, connected to the barrel pot, for



rotationally driving the barrel pot; and

wherein ~~only~~ the ceramic sintered body is put into the barrel pot, and the rotary plate and the barrel pot are rotated.

3. A method of producing a ceramic electronic part according to Claim 1, wherein when the dry-type barrel polishing is carried out, a barrel-type blast device is used, the barrel-type blast device including a barrel pot constructed so as to rotate around a rotary shaft as a center, the barrel pot having an opening; a blast nozzle for ejecting therefrom an abrasive towards the opening in the barrel pot; and a drive source, connected to the barrel pot, for rotationally driving the barrel pot; and

wherein a plurality of the ceramic sintered bodies are put into the barrel pot, and as the barrel pot is rotated, the abrasive is ejected from the blast nozzle to carry out the dry-type barrel polishing.

4. A method of producing a ceramic electronic part according to either Claim 2 or 3, wherein at least a portion of the barrel pot is formed of meshes or of a member with many holes.

5. A method of producing a ceramic electronic part



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according to any one of Claims 1 to 4, wherein the step of obtaining the ceramic sintered body includes the stage of obtaining an unsintered ceramic layered body, and the stage of rounding a corner of the unsintered layered body by subjecting the unsintered ceramic layered body to the barrel polishing.

6. A method of producing a ceramic electronic part according to Claim 5, wherein in the stage of subjecting the unsintered ceramic layered body to the barrel polishing, a dry-type centrifugal device is used, the dry-type centrifugal device including a first drive source, connected to a rotary plate, for rotationally driving the rotary plate; a barrel pot connected to the rotary plate so as to rotate along with the rotary plate around a rotary shaft of the rotary plate and independently of the rotary plate, the barrel plate accommodating the ceramic sintered body therein; and a second drive source, connected to the barrel pot, for rotationally driving the barrel pot.