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Product Comparison between Local Product and Technology Aided Mambong Pottery

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Abstract

There are various traditional Malay potteries such as Labu Sayong, Buyung and Terenang. Kelantan traditional pottery known as Mambong. The objectives of this research are to compare and characterize the density, strength, physical appearance and shrinkage of traditional and slip casted Mambong pottery. Traditional Mambong pottery has been brought from the potter at Mambnog village and slip casted Mambong pottery is made by using slip casting method. Density of sample is measured by using Archimedes principal. Traditional Mambong pottery show the higher value of density compared to slip casting Mambong pottery. The average value of density for traditional Mambong pottery was 1.763 g/cm^3, while the average value of density for Mambong pottery that was fabricated via slip casting was 1.461 g/cm^3. Due to the presence of iron in clay, the colour of Mambong pottery changes from brown to reddish-brown after firing process. Traditional Mambong pottery shows the higher percentage of dry shrinkage which was 9.76 % compared to slip casting Mambong pottery which was 5.72 %. Traditional Mambong pottery also shows the higher percentage of fired shrinkage which was 1 % compared to slip casting Mambong pottery which was 0.58 %. In conclusion, by using slip casting technique, density, physical appearance and shrinkage of pottery can be improved.

1. Introduction

There are various Malay potteries such a Labu Sayong, Belanga, Buyung and Terenang. Kelantan Malay pottery known as Mambong. Mambong is the name of village that is located in Kampung Ulu Sungai Kelantan. Mambong pottery is handicraft based out of clay. Smoke container, round bottom water jar, squat water vessel, vessel with handles, earthenware pot and steam pot are the examples of the Mambong pottery pieces [1]. Mambong pieces are reddish brown because of high content of iron in the clay. Aluminum oxide, iron oxide, silica, calcium oxide, sodium oxide, potassium oxide, phosphorus oxide and magnesium are the mineral materials present in the clay composition used by Kelantan potters [1].

Mambong pottery is not fragile and can withstand high temperature that suitable for use as cooking container [1]. Mambong pottery also suitable for cooling water. Production of Mambong pottery needs very high hand skills. Wooden sticks, bamboo stick, paddle and anvil stones are the simple devices that implement into Mambong. Mambong potters combined two methods which are pre-wheel method and wheel method. To finish the product, Mambong potters use manual wheel.

2. Materials and Methods

Traditional Mambong pottery was brought from Mambong while technology Mambong pottery was fabricated via slip casting method. Slip casting process starting from pouring clay slip into a mold. Water and sodium silicate were mixed together within 15 minutes. After that, clay was added in the mixture of water and sodium silicate to avoid the formation of clots.

The mixture was mixed within two hours or until the homogeneous mixture was obtained. The slip was leaved a day before being used. Mold was prepared by mixing water and plaster of Paris with appropriate amount into desirable shape. The mold was filled with the slip or also known as liquid clay. Traditional Mambong pottery and slip casted Mambong pottery was characterize by their density using Archimedes Principle, physical appearance and shrinkage.

3. Results and Discussion

3.1 Density and porosity

Figure 1 shows the comparison of density between traditional Mambong pottery and the Mambong pottery that was fabricated via slip casting. There were three samples for each traditional Mambong pottery and

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the Mambong pottery that was fabricated via slip casting for density measurement. Density was calculated by using this Equation (1).

$$\text{Density (g/cm}^3\text{)} = \frac{M_D}{M_W - M_S} \times \text{Density of water} \quad (1)$$

Based on Figure 1, traditional Mambong pottery show the higher value of density compared to slip casting Mambong pottery. The average value of density for traditional Mambong pottery was 1.763 g/cm^3, while the average value of density for Mambong pottery that was fabricated via slip casting was 1.461 g/cm^3.

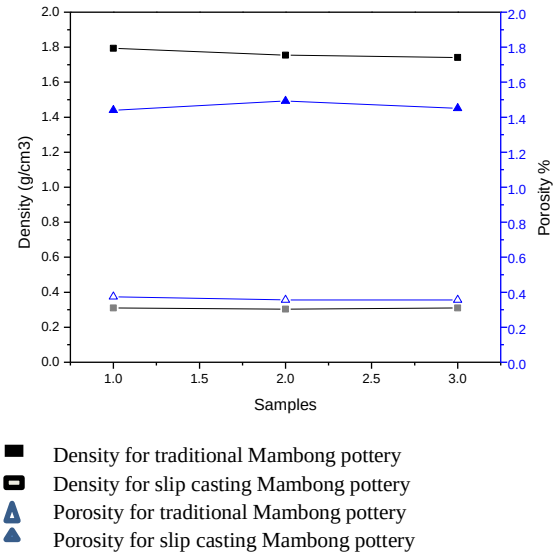

Figure 1: The density and porosity result for traditional and slip casted Mambong pottery.

The particle size of traditional Mambong pottery was not controlled by Mambong potter. Raw clay was grinded by using traditional mortar and pestle after drying process. The grinded clay then was sieved to remove impurities and become clay powder [2]. Meanwhile, particle size for Mambong pottery that was fabricated via slip casting was controlled. Dry raw clay was grind by using grinder machine in order to gain fine grain clay powder. Then the clay powder is sieved with 450 micronmeter siever. Particle distributions for traditional Mambong pottery were not homogeneous compared to Mambong pottery that was fabricated via slip casting.

Theoretically, the density for slip casted pottery should be higher than the traditional casted pottery. It was due to better distribution and more homogenous grain particle size for the slip casted pottery. But in this research, the opposite result was obtained. It might due to the errors while handling the experiment. Porosity was calculated by using this Equation (2)

$$\text{Porosity} = \frac{M_W - M_D}{M_W - M_S} \quad (2)$$

Porosity for traditional Mambong pottery was lower than Mambong pottery that was fabricated via slip casting with 30.8% and 36.2% respectively. Mambong pottery showed close average porosity with the prehistoric pottery samples found from Bukit Tengku Lembu, Gua Batu Tukang, Gua Cha and Gua Kecil that average between 30% and 35% [3].

3.2 Physical appearance

Figure 2 (a-c) shows the color of Mambong clay before and after firing process. The color of Mambong clay before firing process was brown. After firing process, the color of Mambong clay change from brown to reddish-brown for both traditional Mambong clay and fabricated Mambong clay via slip casting. Most of Mambong product was reddish-brown color because of the content of iron in the clay [1]. But, the color does not reflect the amount of iron present besides being the coloring agent of the clay [2].

(a) (b) (c)

(a) Before firing process; (b) After firing process for traditional Mambong pottery; (c) After firing process for Mambong pottery that was fabricated via slip casting.

Figure 2: Colour of Mambong clay powder.

3.3 Shrinkage

Table 1 shows the dry shrinkage and fired shrinkage result for traditional Mambong pottery and Mambong pottery that was fabricated via slip casting. Based on the table, traditional Mambong pottery shows the higher percentage of dry shrinkage which was 9.76% compared to Mambong pottery that was fabricated via slip casting which was 5.72%. Based on the table too, traditional Mambong pottery also shows the higher percentage of fired shrinkage which was 1% compared to Mambong pottery that was fabricated via slip casting which was 0.58%.

Previous research show that drying shrinkage for Labu Sayong was 6 % lower than traditional Mambong pottery but higher then Mambong pottery that was fabricated via slip casting [4]. Firing shrinkage for Labu Sayong was 10 % higher than traditional Mambong pottery and Mambong pottery that was fabricated via slip casting. The shrinkage was calculated by using Equation (3).

$$\text{Shrinkage (\%)} = \frac{L_0 - L_1}{L_0} \times 100 \quad (3)$$

Table 1: Dry and fired shrinkage for traditional Mambong pottery and Mambong pottery that was fabricated via slip casting.

Sample	Dry shrinkage (%)	Fired shrinkage (%)
Traditional Mambong pottery	9.76	1
Slip casted Mambong pottery	5.72	0.58

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4. Conclusion

Mambong pottery is one of the traditional potteries that can be found in Malaysia. It is comparable with other potteries. In the presence of slip casting techniques, it can help Mambong potter to increase the production of pottery manufacturing in the future compare with traditional method. No expensive equipment is required for slip casting technique. A wide variety of complex shapes can be produced by using slip casting methods and finish product have excellent properties because fine powder is most suited to sintering that could not be produced using traditional technique. Density, physical appearance, and shrinkage of the Mambong pottery can be improved by using slip casting technique.

References

[1] Said, T. S., Ramli, H., & Sedon, M. F. (2011). Local Genius of Mambong Pottery in Kelantan , Malaysia. *International Journal of Humanities and Social Science*, 147-155.

[2] Gani N.A, S. M. (2015). Chemical Composition of Clays for Pottery in Malaysia : A Review. *Journal of Tropical Resources and Sustainable Science*, 144-153.

[3] Stephen, C.M.S. (1997). Indigenous Prehistoric Pottery and Technology in PeninsularMalaysia (pp. 176).

[4] Oskar, H.H., Shahriman, Z.A., Anwar, R., Kamaruzaman, M.F, (2015). Proceedings ofthe International Symposium in Research of Arts, Design and Humanities (ISRADH 2014). springer.

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