MOULDING CERAMIC PIECES BY SLIP CASTING USING COLOURED CLAYS FROM COTOVELO BEACH–NATAL/RN

[1,2]Tércio G. Machado, [1]Uílame U. Gomes, [1]Flanelson Maciel Monteiro, [1]Samara Melo Valcacer, [2]Gilson G. da Silva

[1] Universidade Federal do Rio Grande do Norte – UFRN/PPGCEM – Natal/Brazil

[2] Instituto Federal de Educação Ciência e Tecnologia do RN- IFRN – Natal/Brazil

ABSTRACT

Slip casting is an ancient and widely used technique in the production of ceramic pieces due to its relatively low capital outlay and simplicity. This forming technique using liquid ceramic materials has advantages over other forming methods, such as the ease of forming pieces of relatively complex shapes with uniform walls, items with internal cavities or oval forms, in addition to excellent microstructural homogeneity from the deflocculated suspensions. The present work describes the production of pieces by slip casting using the coloured clays from the Cotovelo Beach–Natal/RN (red and yellow, purple clay) and kaolinite clay as raw material (ceramic powder). Thus, the resulting final fired pieces presented a natural colour with various shades, without the need for a glazing step. The raw materials were characterized by EDX, XRF and optical microscopy. We prepared four groups of samples with different coloured clays, and all were sintered at temperatures of 850°C, 900°C, 1000°C and 1100°C. The final products were analysed by testing their water absorption, loss on ignition, resistance to three-point bending, and by colorimetry. In a preliminary step, it was noted that the use of coloured clays, replacing plastic clays that are traditionally used in conjunction with the kaolinitic clay, provided a very satisfactory result, especially in relation to the pieces obtained with the slip-casting technique. With an appropriate percentage of raw materials, the pieces exhibited excellent workmanship, the materials being suitable for additional uses.

The use of coloured clays was observed to be an alternative to the use of dyes or other types of artificial pigments, and constituted an interesting and economically feasible alternative, in addition to providing a more noble use for the clays that are only used for local handicrafts. There is a real possibility for using these clays in the production of ceramic slabs with natural colours, and for use in ceramic coverings. However, further studies are needed in order to obtain products with a lower average water absorption percentage.

Figure 1: *Pictures of the samples before and after the sintering stage: A – Sample before sintering; B – Sample sintered at 900°C; C – Sample sintered at 1000°C; D – Sample sintered at 1100°C.*

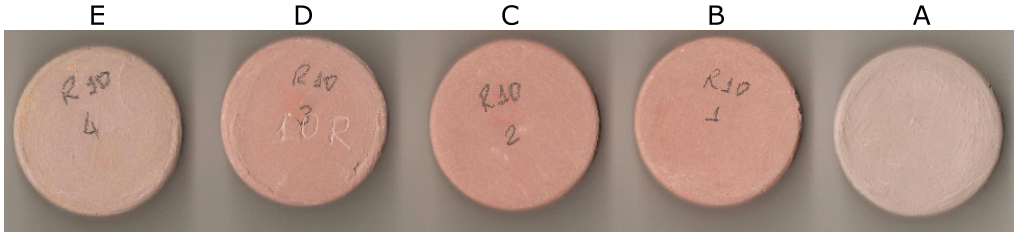

Figure 2: *Pictures of the samples before and after the sintering stage: A – Sample before sintering; B – Sample sintered at 850°C; C – Sample sintered at 900°C; D – Sample sintered at 1000°C; E – Sample sintered at 1100°C.*

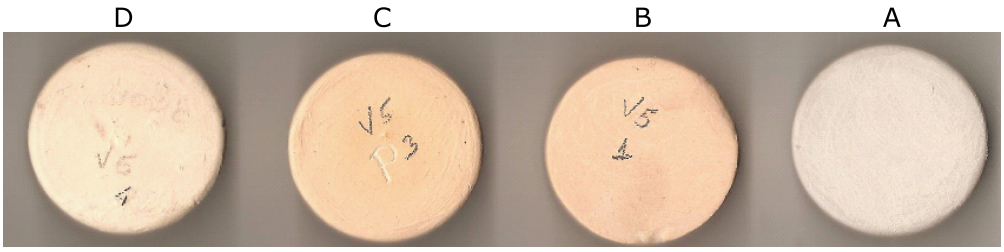

Figure 3: *Pictures of the samples before and after the sintering stage: A – Sample before sintering; B – Sample sintered at 850°C; C – Sample sintered at 900°C; D – Sample sintered at 1000°C.*

This study was undertaken to enable the formation of ceramic products by the wet method, with a composition corresponding to the ceramic earthenware type with different fired colours, ranging from fawn to orange, in the case of yellow clay, while the purple coloured clay went from pinkish to brown at higher temperatures, using only the naturally coloured clays found in the State of RN-Brazil. It was shown that, using only 5% and 10% coloured clay, it was possible to achieve these goals, and that, at a temperature of about 1000°C, the tones were quite pronounced and commercially interesting.

REFERENCES

[1] ANFACER – Assoc. Nacional dos Fabricantes de Cerâmica para Revestimento. **A cerâmica na Atualidade e a Origem da Cerâmica no Brasil**. 2011. www.anfacer.org.br. Accessed on 10 September 2011.

[2] A. C. Morelli e J. B. Baldo. **Barbotinas Cerâmicas Contendo Rejeito de Vidro Soda Cal Para Maturação em Baixa Temperatura**. Cerâmica Industrial, 8 (3) May/June, 2003.

[3] Bustamante, G. M. e Bressiani, J. C. **A indústria cerâmica brasileira**. Cerâmica industrial, no. 5, vol. 3, 2000, 31 pg.

[4] F. M. Monteiro; J. L. de Sousa; T. G. Machado; U. U. Gomes; G. G. da Silva;N. M. Ferreira. **Nova composição de argilas vermelhas do município de São Gonçalo do Amarante-RN para produção de blocos cerâmicos**. 18º Congresso Brasileiro de Engenharia e Ciência dos Materiais, Porto de Galinhas-PE (2008).

[5] J. F. M. Motta, A. Zanardo, M. Cabral Júnior, In: **As Matérias-Primas Cerâmicas. Parte I: O Perfil das Principais Indústrias Cerâmicas e seus Produtos**. In: Revista Cerâmica Industrial, volume 6, 2nd ed. p. 28-39, 2001.

[6] M. A. F. Melo, S. G. Neto, D. M. A. Melo, L. P. Carvalho, J. N. Galdino, S. A. G. Silva. Cor e propriedades mecânicas de algumas argilas do Rio Grande do Norte para uso em cerâmica branca. Cerâmica, 48, 308 (2002) 183.