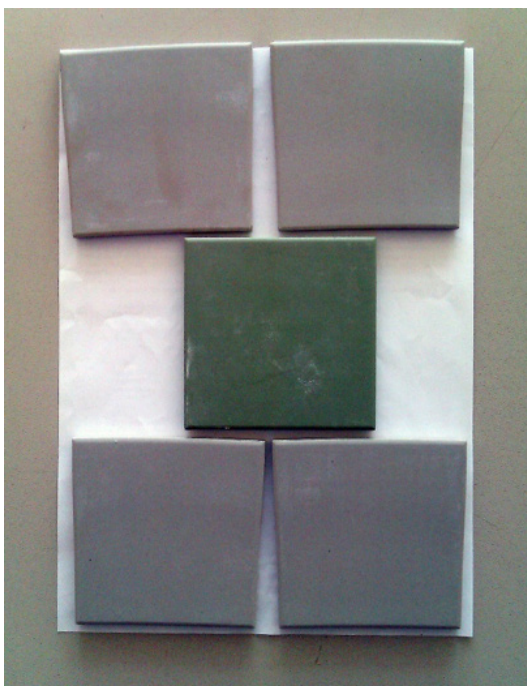


Novel Ultrasonic Sensor-System for In-Line Density Gradient Determination of Ceramic Tiles / NOVAPRESS

the objective of the project

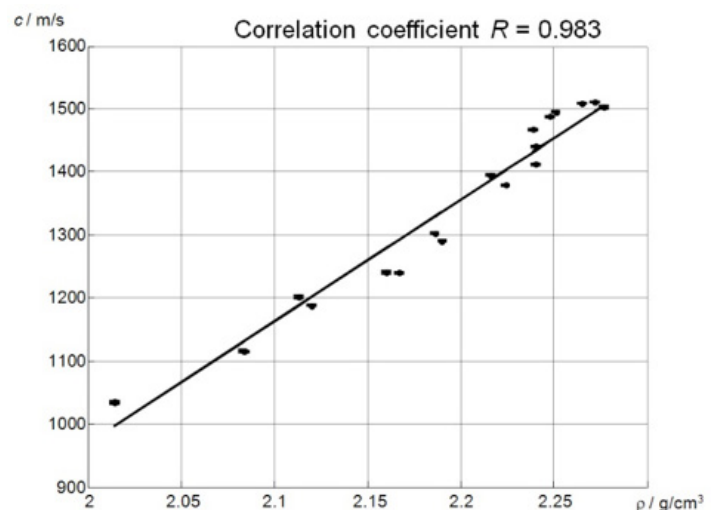
Development of an in-situ sensor that enables measurement of the density of green ceramic tiles during pressing by using Ultrasonic Pulse Velocity measurement.



The ceramic tiles after firing. The shape distortions are caused by different apparent density in the green tiles

problem

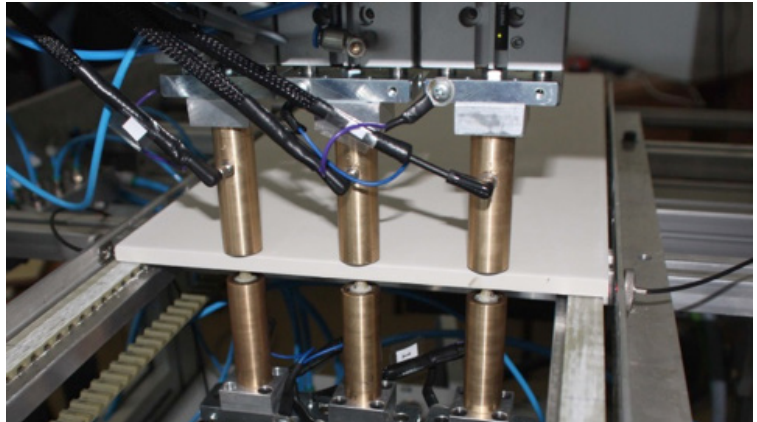
The occurrence of density gradients in ceramic tiles during pressing is believed to be the main cause of defects during processing. Problems such as differential shrinkage and warpage (bending of tiles) typically arise leading to losses or down-grading of final products. Currently, these faults go undetected until been fired, rendering them scrap, which is difficult to recycle and often sent to landfill.



Correlation between ultrasound velocity and density of the test samples of green ceramic tiles



Dry contact ultrasonic transducers for testing green ceramic tiles



The experimental set up (rig) for „on-line“ measurement of green tile density during the pressing process

solution

Measurement of the ultrasound velocity across green ceramic tiles is based on the through-transmission “point” type technique. The density distribution in a green tile is evaluated from the ultrasound velocity measurement results using determined dependency of the ultrasound velocity on density in green ceramic tiles.

ultrasound institute

Ultrasound Institute developed the ultrasonic technique for measurement of non-uniform distribution of the green ceramic density using dry coupling.

The dependency of ultrasonic longitudinal wave velocity on a green tile density was determined. The technique of green ceramic tiles mapping using the “point” type through-transmission mode ultrasonic measurements was developed. The special ultrasonic transducers were developed and manufactured for this purpose.

project partners

CERAM Research Ltd (UK), F.lli Rossi fu Cesare SpA (Italy), Microlog Srl (Italy), CNS Farnell (UK), Topcer (Portugal), University of Modena and Reggio Emilia (Italy), Ultrasound Institute, Kaunas University of Technology (Lithuania), LEMA srl (Italy) Elektronines sistemas UAB (Lithuania).

related publications

1. **M. Romagnoli, M. Gualtieri Lassinantti, A. F. Gualtieri, R. Šliteris, R. Kažys, G. Tari.** Anisotropy of green stoneware evaluated by ultrasound measurements in combination with texture analyses. Journal of the European Ceramic Society. Oxford: Elsevier. ISSN 0955-2219. 2013, vol. 33, iss. 13-14, p. 2785-2792.