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NEW PROSPECTIVES IN THE APPLICATION OF LASER ULTRASONICS FOR ON-LINE QUALITY CONTROL IN THE CERAMIC INDUSTRY

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Summary

The problem of on-line measuring and controlling the properties of green tiles (as bulk density, moisture, structural integrity, etc.) is well known in ceramic industry. These properties can, in fact, strongly affect the quality of the final products with relevant economic consequences. Important developments have been therefore tackled by industry and research in this field.

After some years of research in the EU funded project *Sensocer*, techniques based on non-contact ultrasonic probes have been developed to measure the bulk density of ceramic tiles directly on the line after pressing. These systems have recently demonstrated enough accuracy for industrial applications (repeatability below 10 kg/m³) and are being now exploited in an industrialisation phase by SACMI. The impact of such systems is relevant not only for quality control, but also to avoid mercury use by on-line operators.

Research is not however stopped in this field. A new generation of devices based on Laser Ultrasonics (LUT) is currently under research at the Mechanical Department of Università Politecnica delle Marche with promising results. In this approach, ultrasound generation is due to the phenomena produced on the specimen surface after a pulse laser strike. The generated ultrasonic waves are detected in this case with a non-contact electro-capacitive transducer.

This paper presents a first attempt of exploiting such technique on green ceramic tiles which are porous materials with very low heat conductivity. The achievable information are relevant for the control of bulk density and structural integrity with very high spatial resolution and potential flexibility for on-line application.

Advantages and disadvantages are critically discussed in the work, having as reference the point of view of end-user needs and production line requirements. The article enters in details of the calibration procedure on different types of ceramic bodies.