



**RAPID DRYING OF CERAMICS
REDUCING ENERGY CONSUMPTION
AND CO₂ EMISSIONS
WHILE PRESERVING
PRODUCT QUALITY**

RAPID DRY NEW BODIES

INTRODUCTION

Rapid Dry project is developing an optimization of the drying process in ceramic manufacturing through an innovative automated chamber dryer and new bodies formulations, in order to reduce energy and raw materials consumption and CO₂ emissions without compromising the products quality. The EU LIFE project has started in July 2020 and is led by the Italian company SE.TE.C in collaboration with LCE.

In the ceramic production process, a sound synergy exists between the drying activities and the slips formulation. Water is largely used with the raw materials mix and it must be evaporated in dryers before the final placement of ceramic bodies in the firing kiln.

The choice of raw materials can influence both the speed of the drying process and the probability of ceramic bodies breakages. Moreover, while in tiles production the use of secondary raw materials (glass cullet and ceramic waste) amounts today to an average 35-40% of the body, in sanitaryware this is still not a common practice, due to difficult shapes and other technical issues. One of the Rapid Dry goals is to rigorously modify ceramic bodies to optimize the drying curve while preserving excellent performances in quality and resistance and reducing raw materials consumption.



THE RAPID DRY BODIES DEVELOPMENT PROCESS

The aim of the process is to select the best raw materials and to fine tune the optimal slip formulations to develop new vitreous china (VC) and fire clay (FC) mixtures able to improve the drying performance while maintaining the same characteristics of a standard dough. SE.TE.C, whose research and experience in the ceramic sector exceeds 30 years, has conducted lab trials and measurements on a variety of formulations to identify and correct critical issues and select the mixtures with the best performances.



After the selection, pre-industrial trials have been implemented to test the new VC and FC bodies formulas during the casting and drying phases. Through the use of a small SETEC pilot dryer and maintaining the same conditions, conventional and new formulas bodies have been produced to compare the behaviour of the old and new mixtures.

TRIALS RESULTS

Rapid Dry new bodies present important improvements with respect to the traditional formulations:

- Drying time reduction thanks to lower dimensional shrinkage and a better Bigot curve;
- Improvements mechanical resistance in raw and fired pieces, that lead to scraps reduction;
- Better crazing resistance thanks to a lower water absorption and improvement in dilatation coefficient;
- 8-10% reduction costs compared to traditional bodies;
- New Rapid Dry VC and FC mixtures have more recycled materials (additional 7-8%) than conventional formulas.



PROJECT DESCRIPTION

Rapid Dry project will develop an innovative fully automated chamber dryer that reduces energy consumption, and new slips formulations (fire clay and vitreous china) to optimise the drying curve and to include the use of recycled raw materials, reducing resource consumption. The combined application of the proposed technologies has the potential to significantly reduce production costs.

The ceramic body's drying process is used for sanitaryware, refractory ceramics and smaller production of tableware. Usually, water is used for a thorough mixing of raw materials and shaping of ceramic bodies, and must then be evaporated in dryers before placement in the firing kiln.

A close relationship exists between drying, the particle size of the body and the mineralogical composition. One of the best ways to optimise drying is to modify the slips, and this is why the project focuses not only on the development of an innovative dryer but also on the optimization of slips formulations.

Ceramic non-tiles production includes about 60-70% of the entire ceramic manufacturing and accounts for about 25-30% of CO₂ emissions. Thus, the implementation of the proposed technology would have a transformative effect on the sustainability of the European ceramic sector.

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