WITH THE CONTRIBUTION OF THE LIFE
FINANCIAL INSTRUMENT
OF THE EUROPEAN UNION
LIFE19 CCM/IT/001243

RAPID DRYING OF CERAMICS REDUCING ENERGY CONSUMPTION AND CO_2 EMISSIONS WHILE PRESERVING PRODUCT QUALITY

TECHNICAL FACTSHEET

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www.rapid-dry.eu

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Technical factsheet n.4

RAPID DRY FINAL RESULTS

INTRODUCTION

Rapid Dry project has optimized the drying process in ceramic manufacturing through the development of **an innovative automated chamber dryer and new body formulations**, in order to reduce energy and raw materials consumption and CO_2 emissions without compromising the products quality. The EU project started in July 2020, was completed in December 2022 and was realised by SE.TE.C. in collaboration with LCE.

RAPID DRY DRYER

- Introduction of a **PLC system** that optimizes recirculation and extraction of humidity and temperature within the dryer, through the automatic control of the circuits.This allows to obtain a better control and reduce consumption
- Installation of **fans (cones)**. These particular air-circulating units have been inserted to improve the mixing of fresh hot air and recirculating air and ensure a uniform air flow air flow through the dryer chamber
- Installation of **rotating cones** inside the dryer that allow the correct movement of air, providing for a high turbulence and guaranteeing a homogeneous distribution of the air on the pieces to be dried.
- The dryer can be used in the production process of sanitaryware, tableware, refractory ceramics and ornamental ceramics, therefore almost **all ceramic sectors except from tiles**.

RAPID DRY SLIPS (VITREOUS CHINA AND FIRE CLAY)

- Addition of **chamotte** (derived from grinded broken ceramic pieces), to reduce the consumption of virgin raw materials and the amount of ceramic waste sent to landfill
- Changes to the rheology and to the grain size distribution, **to optimize plasticity and grain size distribution**. This allows **to reduce the drying time** and simultaneously **increase the bending resistance of the bodies**.
- The Rapid Dry slip formulations are only addressed to the **sanitaryware sector**.

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INDUSTRIAL RESULTS

RAW MATERIALS CONSUMPTION
-6%

GAS CONSUMPTION
-67%

ELECTRICITY CONSUMPTION
-86%

DRYING CYCLE IN TRADITIONAL DRYER

14h WITH TRADITIONAL CERAMIC SLIPS

DRYING CYCLE IN NEW RAPID DRY DRYER

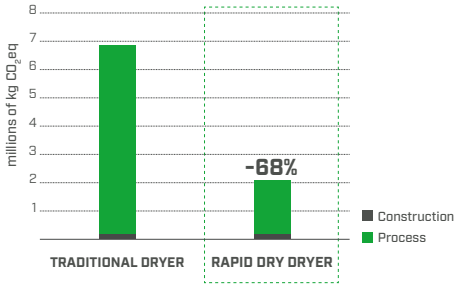
8h WITH TRADITIONAL CERAMIC SLIPS

7h WITH RAPID DRY SLIPS

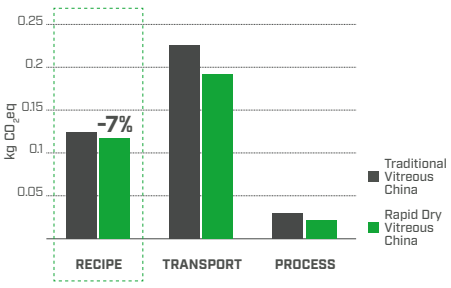
0 DAMAGED OR BROKEN PIECES

ENVIRONMENTAL RESULTS

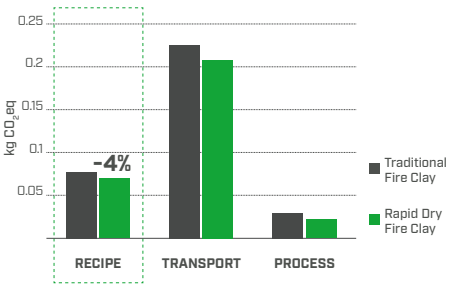
GREENHOUSE GAS EMISSIONS IN THE LIFE CYCLE OF A DRYER (30 YEARS)



GREENHOUSE GAS EMISSIONS PER 1 kg OF VITREOUS CHINA



GREENHOUSE GAS EMISSIONS PER 1 kg OF FIRE CLAY



ECONOMIC RESULTS

-25%
costs over the life cycle of a dryer using **RAPID DRY VITREOUS CHINA BODIES**

-31%
costs over the life cycle of a dryer using **RAPID DRY FIRE CLAY BODIES**

-than 1 year
the time needed to repay the higher investment due to the purchase of the **NEW RAPID DRY DRYER**

RAPID DRY

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PROJECT DESCRIPTION

Rapid Dry project developed 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 CO_2 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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