

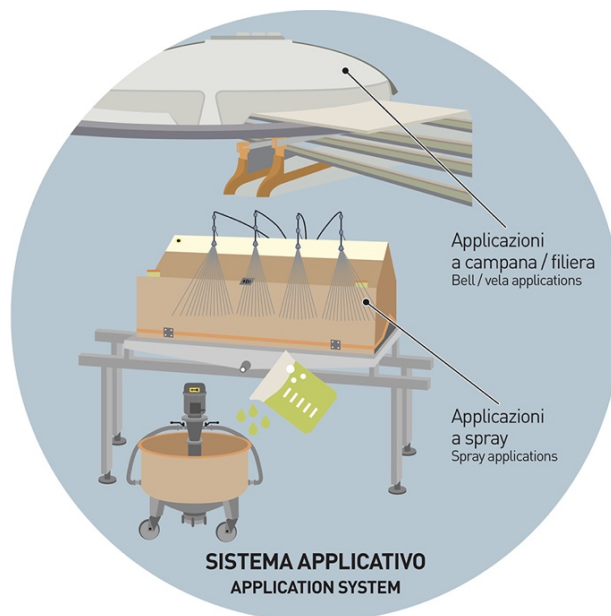


Contents

| | |
|---|----|
| 1. Glazes, application technologies and defects | 02 |
| 2. TV Screen effect..... | 03 |
| 3. Surface tension..... | 04 |
| 4. Problem management..... | 06 |

1. GLAZES, APPLICATION TECHNOLOGIES & DEFECTS

Ceramic glazes can be applied on the raw support by using different methods according to technologies available and the results to be achieved. Among *analogical* technologies, such as vela and bell applications, the airless spray application is today the most common and used. Beside these systems, we must also consider different kinds of glaze discharge: digital applications systems by means of digital printing machines and systems that are based on new generation technologies that can be ideally considered as a mix of the two and that we could define as *mechanical system applications*.



Regardless of the chosen technology, the preparation and application of the glaze – if not properly managed – can promote some defects during production able to compromise the ceramic material, both technically and aesthetically.

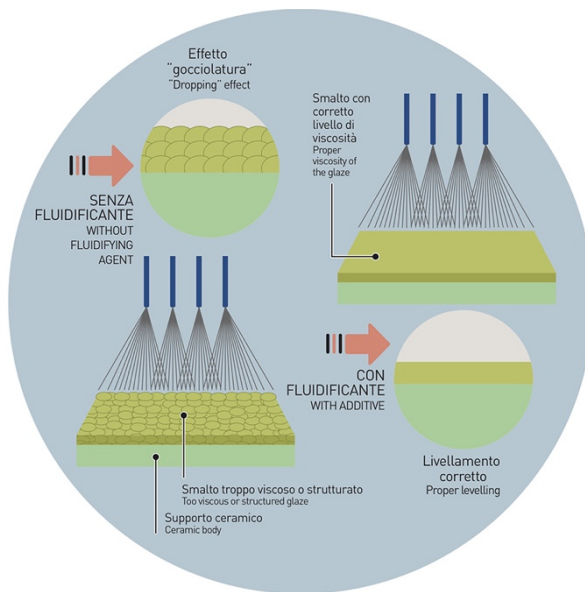
Already in the grinding process (glazes are developed by milling frits and raw materials in water), the use of chemicals able to provide the glaze with rheological stability and the required features is fundamental. However, this first chemical addition may not be enough, since the glaze may show imperfections during application, usually promoted by non-standard parameters of the glaze and/or of the set-up of the application machine.



ZSCHIMMER & SCHWARZ CERAMCO

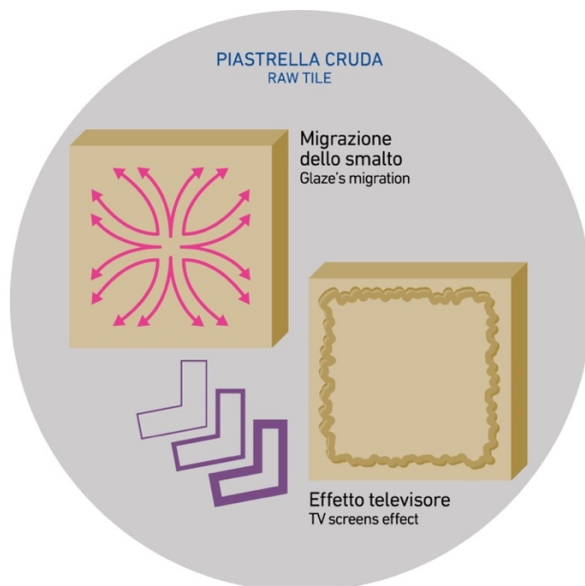
3 | 5

Among the most popular defects, we can mention **orange peel** effects deriving from an improper leveling of the glaze, **dusting phenomena** promoted by a lack of cohesion within the aqueous system, **holes and pinholes** developed by improper drying times or by a chemical incompatibility between the layers that form the ceramic body (engobe, grit, glaze)



2. TV SCREEN EFFECT

Among the several problems, the **TV Screen effect** is one of the most strange and unique. It consists of a sort of migration (or movement) of the glaze towards the edges of the tile that turns in thickening of the glaze along the perimeter of the tile. An unsightly effect that recalls a cathode ray tube screen. This is the reason of the name.





ZSCHIMMER & SCHWARZ CERAMCO

4 | 5

ROOTS OF THE PROBLEM

The problem can be produced by several and different causes. The most significant is the high values of water's surface tension. Water that, together with the solid part, forms the glaze suspension. The latter tends to take a spherical shape moving towards the extremities of the ceramic support to decrease the surface energy that is promoted by the high surface tension.

3. SURFACE TENSION

Surface tension is the tendency of liquid surfaces at rest to shrink into the minimum surface area possible. Thanks to their cohesive force, glaze particles at the interface*** liquid-air are bound, developing an invisible film. Such force is precisely called surface tension.

Surface tension is what allows object marked by a density that is higher than that of water, such as razor blades or insects, to float on a water surface without sinking.

Among all liquids, water is marked by the highest values of surface tensions. Surface tension is an intensive property of liquids that does not depends on the extension of matter, that is the mass.

Under a microscope: a **molecule in the liquid** is surrounded by similar molecules and it undergoes to balanced attractions that take place in all directions, and that therefore nullify the forces that act on that molecule. The molecule remains in its place.

If instead we look at a **molecule that is on the surface of the liquid**, we will notice that – since the molecule is not totally surrounded by similar molecules – the forces that act on that molecule will develop a downward force leading to a contraction of the liquid. In other words, the molecule is pulled inwards.

If you want to expand the liquid surface you it is necessary to counter the trend towards concentration by using an important amount of energy. This energy is the surface tension.

4. PROBLEM MANAGEMENT

Two are the most important options to better manage the tv screen effect preventing and avoiding the outward migration of the glaze.

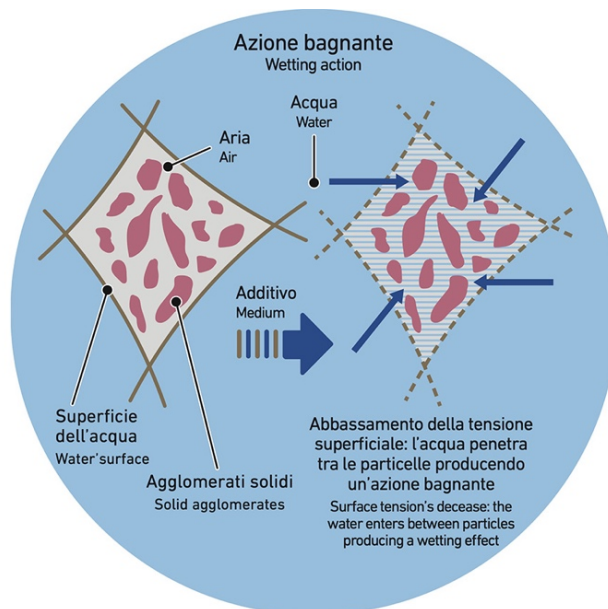
- a) To increase the glaze's draining times on the tile support by means of proper chemicals. This action is able to stop the migration process of the glaze forcing it to remain still in its original position.
- b) To decrease the glaze's surface tension by adding proper wetting agents. The lowering of the surface tension, in fact, is the most important action that stop the movement of the glaze within the system. Sometimes, it is recommended the use of PARTIALLY WATER-SOLUBLE chemicals that act as levelling agents and that are marked by the ability to *wet* the inorganic particles of the glaze by decreasing the water's surface tension. This action leads to de-agglomeration of the solid particles promoting their dispersion within the system. The decrease of the surface tension makes the water to freely move between the suspended particles. The de-agglomeration, together with the decrease of the surface tension, leads to a



ZSCHIMMER & SCHWARZ
CERAMCO

5 | 5

perfect levelling action that prevent the formation of the cathode ray tube on the edges of the tile.



www.zschimmer-schwarz-ceramco.it

www.ceramco.it

www.zslab.it