Decoral® Thermo Series. Sublimable powder-coatings that change color with increasing temperature, thus revealing heat-transferred decors in the background.

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The remarkable interest in heat-transfer technology as a process for the decoration of surface and objects has lead Decoral System to the development of new amazing products: thermochromic powder coatings. For these new products innovative chromophors are employed, which become colorless with increasing temperature, thus revealing what has been previously sublimated in the background. This is how originated the new series Decoral® Thermo: these products bring about an add value for objects that could show an optical change connected to a temperature variation; they can lead to a new usage and to the development of new functionalities for every kind of powder-coated object.

Technological developments
Provided of special pigments that change wavelength absorbance when heated, the Decoral® Thermo powders switch from colored to transparent with a striking effect. These transitions are reversible: the color of the powder-coat starts to fade-out as the transition temperature is reached, becoming then totally transparent; the surface regains immediately its original color as soon as it cools down, below the temperature of transition.

Sublimation
If we combine heat-transfer technology with the Decoral® Thermo powders, dramatic and stunning effects are achievable: by matching the color of the powder coat and the inks of the heat-transfer film, it is possible to make a picture (as well as a writing or a decor) appear and disappear by changing temperature: indeed, when the special pigments of the thermochromic powders change from colored to transparent, the underlying picture becomes fully visible.

The possibility to transfer writings, logos or decors into the powder-coated surface allows to increase both the aesthetic and the functional value of the object.

The powder-coatings of this series are generally applied as top-coat on a white (or colored) layer of paint; once the thermochromic layer has become transparent at a
certain temperature, the first layer of paint shines through, thus giving the effect of a change in color. This technique also strongly enhances the contrast of the color variation, and makes the sublimated image stand out even more.

Figure 1: heating and cooling of a surface coated with Decoral Thermo (PE 411 + Thermo 008) products, and sublimated. Thermal transition.

**Variants and special formulations**

These powders are available in matt, glossy, and textured version, and they are all suitable for the decoration with heat-transfer technology. It is possible to produce thermochromic powders that change from colored to transparent at different temperatures:

- 5÷8°C
- 15÷18°C
- 28÷30°C
- 50°C

Powders that change color in the 5÷8°C range can be employed to coat objects that distinguish outdoor/indoor temperatures, or that detect the fine conditions for food storage (fridge temperature). The 15÷18°C range is typical of home environment, while 28÷30°C can be interesting for skin contact use, since this interval is very close to body temperature. The powders that switch to transparent at 50°C can be employed in the field of safety: writings and signals would appear when temperature starts rising and becoming dangerously high.

The blending of the base colors can afford several different shades: black, red, orange, blue, green and yellow are just some of the many, and the use of a colored first coat under the thermochromic layer will afford an even richer variety of tonalities.
Figura 2: available colors, before and after heating.

Pigments characterized by different temperatures of transition can be mixed together to obtain surfaces with multiple temperatures of color change: we could have a first transition between 5°C and 8°C, and a second one between 28°C and 30°C; this way, the user may know with just a glance whether the powder-coated object is under 8°C of temperature, above 28°C, or in the range in between.

**Conclusion**

The characteristic of these products gives amazing qualities and innovative functionalities to objects and surfaces. Interesting fields of application can be safety, signposting, graphics and design, and marketing solutions. The only limit is your imagination.

Arcole, Aprile 2014