Resumen nº 5

Principles in tile digital printing designing

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1- Abstract

The purpose of this article is to show how to design a ceramic tile in digital printing method, introduction and know how to do problem shooting of digital printing design
In order to do this, it was necessary to go back to the origins of design and know about principles of digital printing.
This article focused on basic of quality control in digital printing, color management, color tones and adjustment, images formats, multichannel mode, design correction, modification, calibration and preparation for digital printing in ceramic tiles.

2- Introduction

It is now being increasingly ink-jet printing applied to commercial printing and certain features make it particularly attractive for printing in a manufacturing environment. Therefore there is necessary to know how to manage a design and color to have a good quality design with low cost in a best time.
There are so many companies in all around the world especially in Spain, Italy and China which produce digital printing machinery but in fact, the basis and foundation of all of them is the same. All of the machineries have printing head with approximately same quality and conditions, computer for controlling design and connections for data transferring to the printing machine and some other applications. In this case we can control and manage printing conditions and design to have a best quality and lowest price.
In digital or ink-jet printing we must to know more about the digital image. A digital image is a numeric representation (normally binary) of a two-dimensional image. Depending on whether the image resolution is fixed, it may

be of vector or raster type. In digital printing system we always work with raster type formats like TIFF, JPG, PSD, EPS, ….

Raster images have a finite set of digital values, called picture elements or pixels. The digital image contains a fixed number of rows and columns of pixels. Pixels are the smallest individual element in an image, holding quantized values that represent the brightness of a given color at any specific point.

Raster images can be created by a variety of input devices and techniques, such as digital cameras, scanners, designers, and more. They can also be synthesized from arbitrary non-image data, such as mathematical functions or three-dimensional geometric models; the latter being a major sub-area of computer graphics. The field of digital image processing is the study of algorithms for their transformation.

Each pixel is a sample of an original image; more samples typically provide more accurate representations of the original. The intensity of each pixel is variable. In color image systems, a color is typically represented by three or four component intensities such as red, green, and blue, or cyan, magenta, yellow, and black.

Before digital printing, in traditional method, development of the tile is depended on color preparation and screen printing on laboratory. For any new design technicians mix pigments with printing powder in consentaneous proportion to achieve a desired color after firing. They apply design with screen printing to print a sample. Then for rotary printing a test band will be prepared to test the effect of engraving and design with the cylinder. If all previous steps are performed correctly then a complete engraved cylinder must be ordered and industrial test of design starts in glazing line. But in digital printing method all of the previous steps are removed and there is no need to prepare and mix colors in laboratory and doing so many tests to prepare a design.

Quality control and test chart in digital printing

For controlling intensity of the color in digital printing, spectrophotometer been used more than human eyes controlling. ISO 12647-2 standards of offset printing nowadays is using for controlling ΔE, ΔL^* , $\Delta_{density}$ but in a private ISO standard for digital printing in essential.

Test chart is combination of colors and designs to help controlling any defects of digital printing during production. To compare a tolerance between colors in industrial production the test chart background chosen gray in CMYK mode with Cyan 25%, Magenta 19%, Yellow 19% and Black 20%. These are the four colors of ink used in digital method of printing. The three colors, plus black,

roughly correspond to the primary colors, from which can be mixed colors across the visible spectrum. CMYK is a color mixing system that depends on the pigments to achieve the desired hues. By using this combination of colors for test chart background, any defects in uniformity of colors will appear better because human eyes can recognize details better in this kind of gray tone.