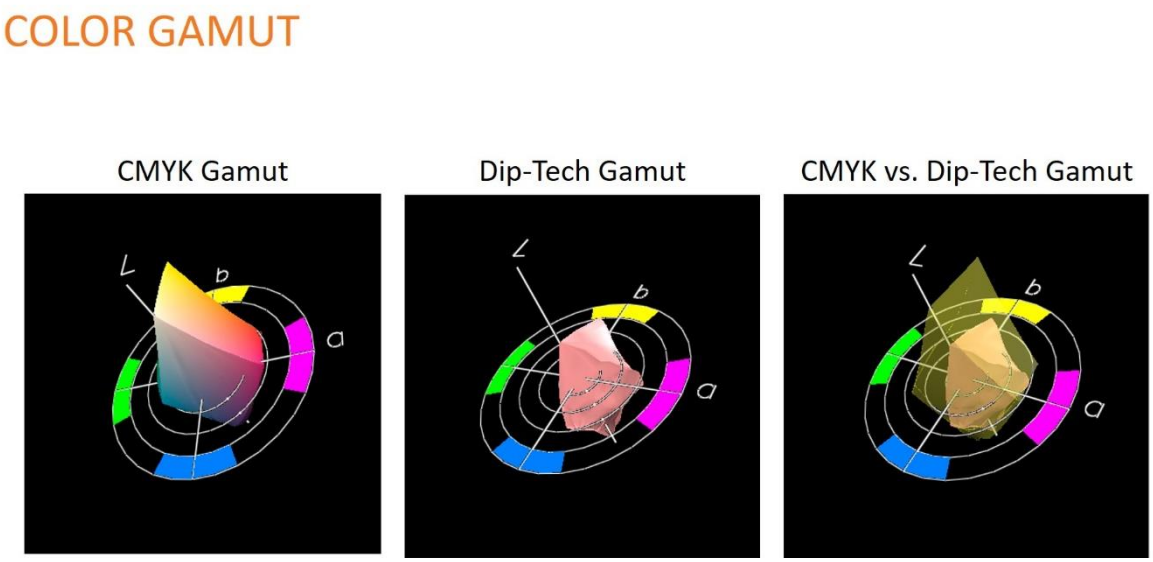
Ceramic Digital Printing

Basics, influencing variables, reasons for complaint

Basics

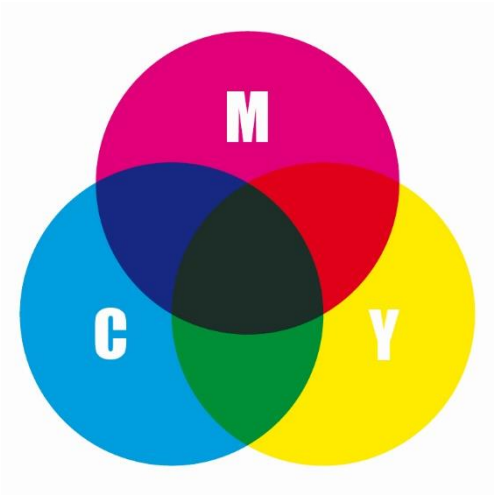
Ceramic inks consist primarily of finely ground glass powder, inorganic color pigments (refractory metal oxides) and a liquid medium. Of course is their structure much more complex, but that should suffice for now.
Metal oxides are only available in a limited range of colors.
Therefore, not all colors can be displayed.

To illustrate, here are the different gamut values of the different color spaces.
Gamut is the set of all colors that a device or color space can represent.

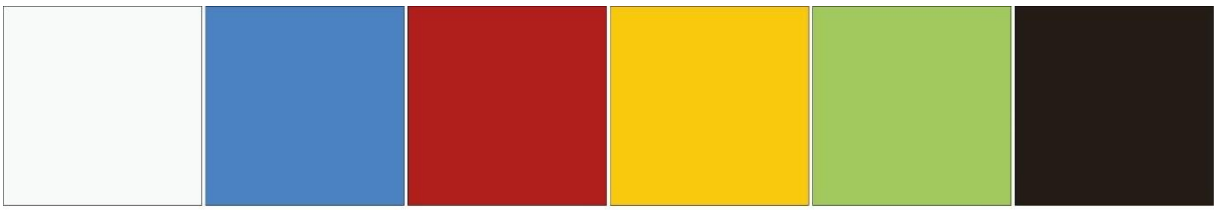


The CMYK color space is the color space we are most familiar with.

Here are the primary colors that make up the CMYK color space:



For comparison, the basic colors of a digital printing machine:



If we imagine the specified colors as a paint box, it becomes clear that we cannot display certain colors with this.

Example

Planning phase of the architects:

Realisation:

To give the customer a presentation of his project, you should give the customer a digital color proof to his hand in any case. However, the best way is to print a sample glass .

In most cases you will get the printing templates as digital files. There exist two different types of files. One is vector graphics and the other is pixel graphics.

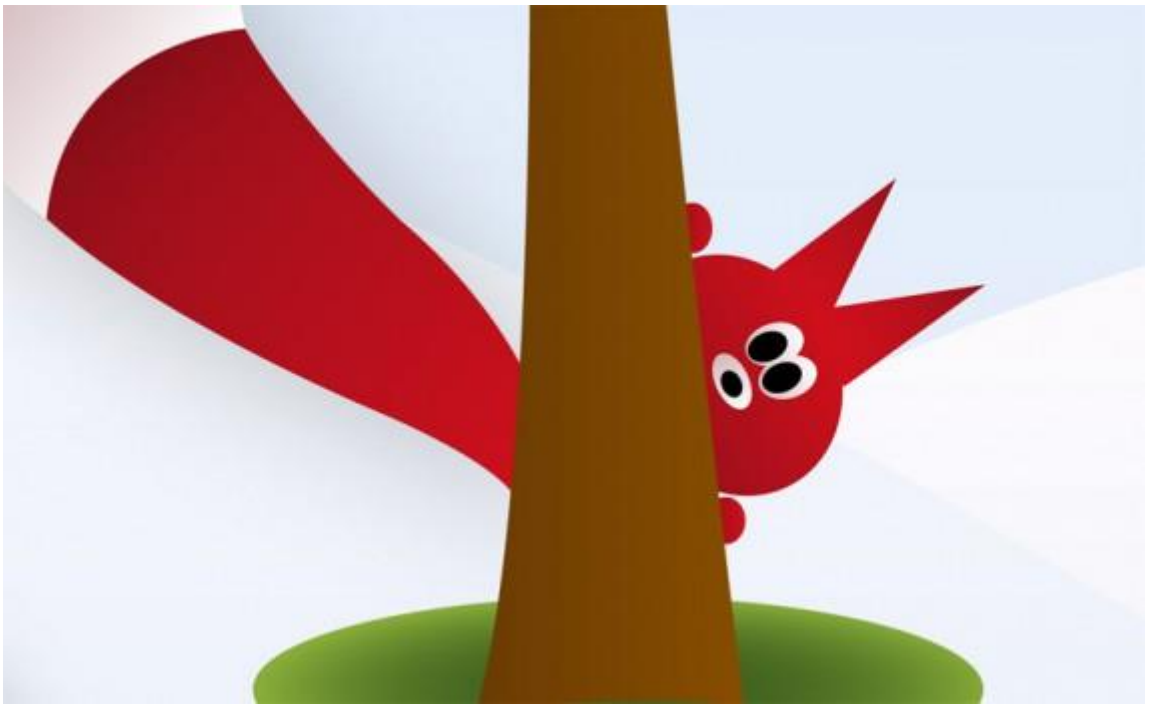
Properties vector graphic:

Scalable to any size without loss of quality

Razor-sharp display

No photorealism

Low memory requirement



Properties pixel graphic:

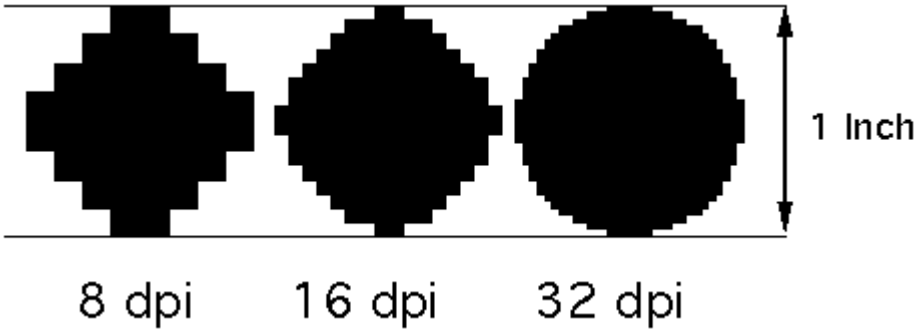
Photorealism possible

High storage requirements

The number of pixels is important

Qualitative influencing factors

An important factor influencing pixel graphics (photos) is the number of DPIs. This is measured in pixels/inch (2.54 cm). A resolution of 300 dpi is considered razor sharp. As the DPI number decreases, the image becomes increasingly blurred to the point of being unrecognizable.



Another influencing variable is the basic quality of an image.

Was the picture taken with a bad camera? Is the picture already blurred in its original state?

Such image disturbances are called artifacts. Artifacts are any image details in digital photography that represent an unintended difference from the image source. These can be: image noise, graininess, color casts, moiré effect, block artifacts, to name just a few.

Example of block artifacts

Important

Images should always be viewed on a calibrated monitor to ensure a neutral assessment.

Another important role in assessing printed glass is played by the light and its color temperature.

The color temperature of light is measured in Kelvin. Normal daylight corresponds to a color temperature of approx. 5400 Kelvin, while warm artificial light is approx. 3200 Kelvin.
Different light sources can change the coloring of an object decisively.

Example

5400 K 3200 K

For certain projects, it can make sense to ask about the installation situation and the lighting conditions.

Another quality feature is the difference between the tin bath and the fire side. It should always be printed on the fire side, as this is largely residue-free and ensures optimal adhesion of the ceramic colors after firing. Furthermore, colors on the fire side are rendered relatively neutral, while the tin bath side can have a slight gray cast.

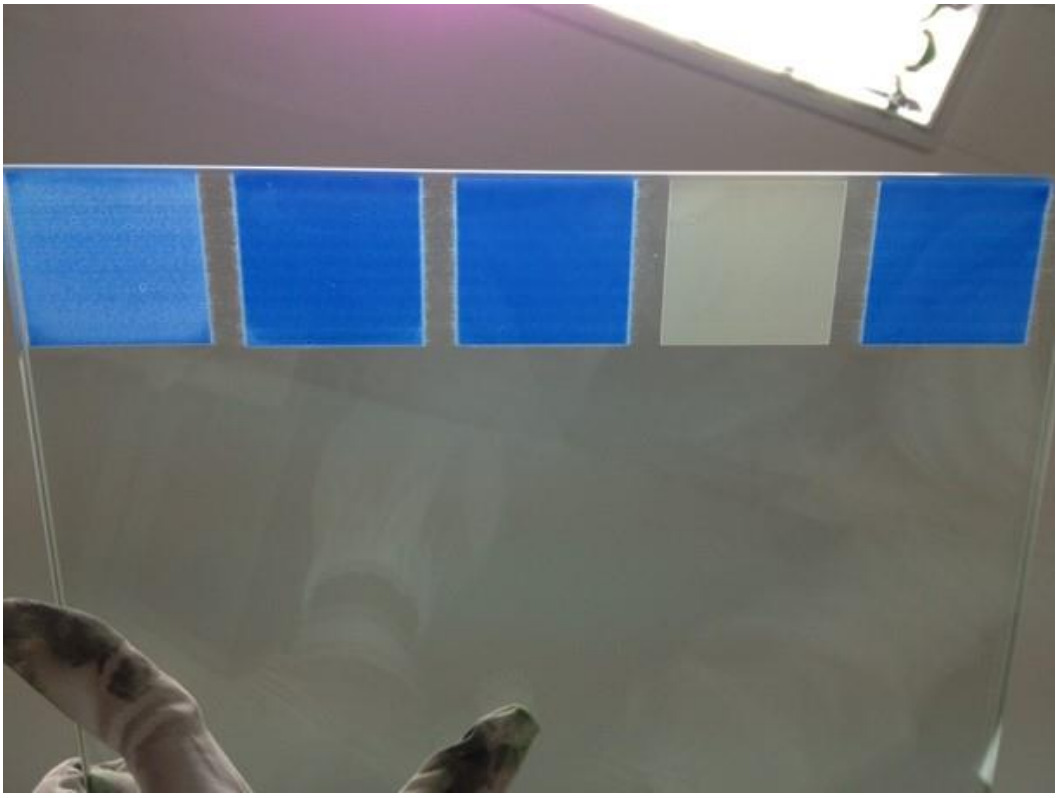
Other influencing factors are the type of glass (e.g. float or clear glass) and the firing parameters.

The coloring also depends on the batch. Different batches of the same type of glass can produce different color effects.

Reasons for complaint

Technical causes

Spray



Causes:

Overheating of the printheads

Incorrect compressed air values

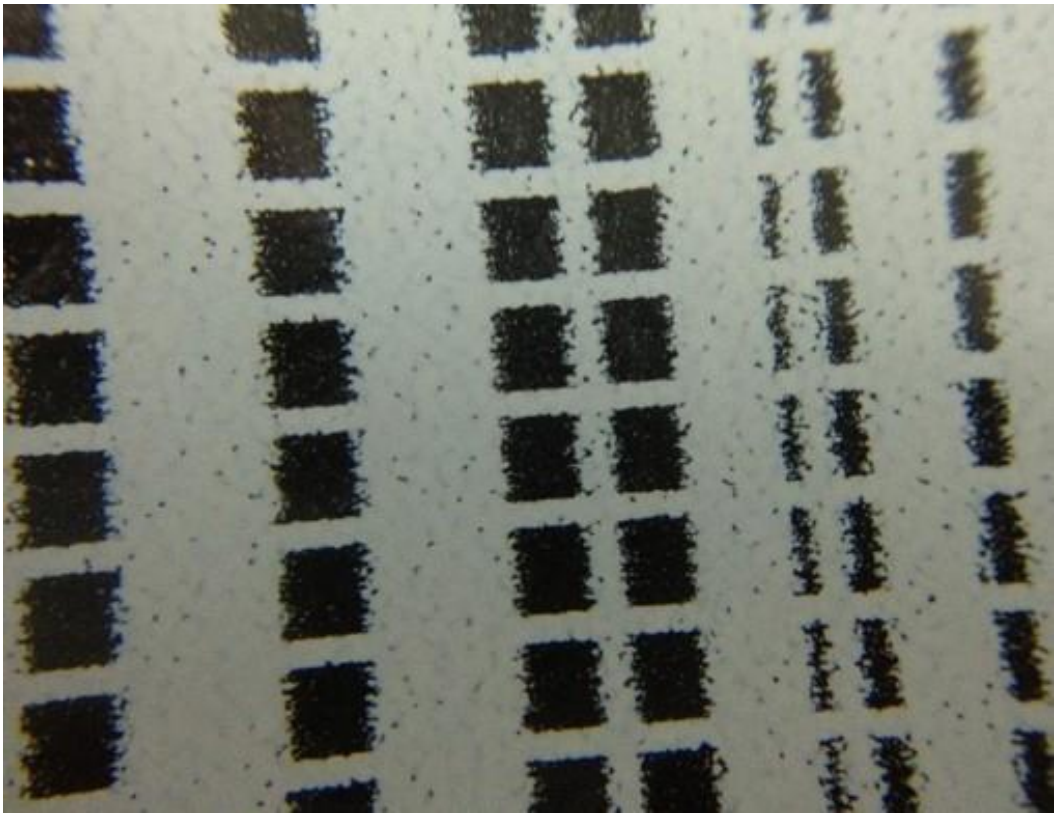
Incorrect glass thickness setting

Incorrect calibration of the print head plate

Solvent residue after washing the printheads

Liquid in the vacuum system

Blurred print image



Causes:

Improper print frequency

Bad file preparation

Incorrect printhead calibration

Incorrect vacuum value

Liquid in the vacuum system

Overheating of the printheads

Incorrect glass thickness value

Banding

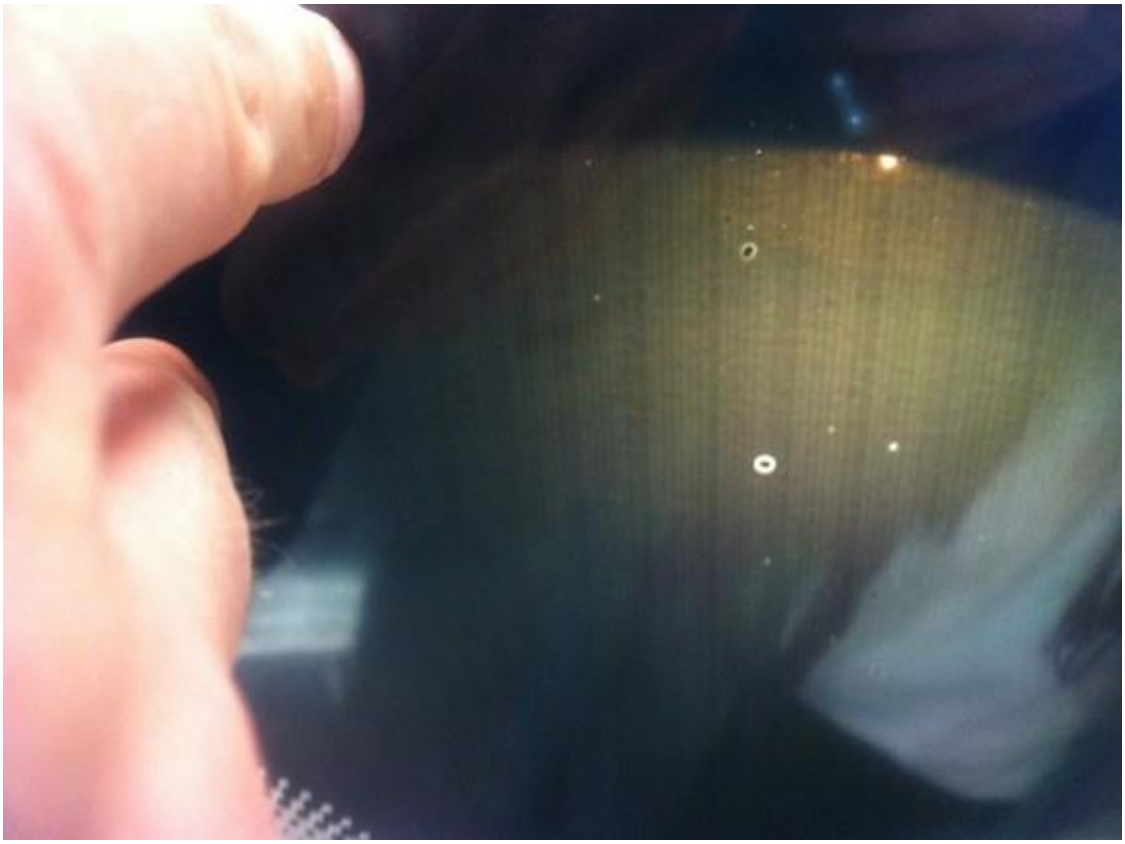
Causes:

Wrong vacuum value

Incorrect print frequency

Incorrect print mode

Pinholes and fisheyes



Causes:

Dust from the air

Oil residue on the glass

Coated glass

Oil in the paint and in the vacuum system