KULSEN & HENNIG
DOMINIK KULSEN
Nature's Brilliant Colours

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Dazzling Perspectives – Proper Lighting for Diamonds

In this edition:

Colour and Brilliance through Light

The beauty of a cut Natural Fancy Coloured Diamond is due to its excellent **optical properties**, such as high refraction and colour dispersion, as well as a light to intense **body colour** (e.g. Fancy Light Pink to Fancy Vivid Pink).

A diamond's **colour** and **brilliance**, however, only appear when exposed to the influence of light. A word of caution, though: **not all light is the same**! Below, we will explain why the right light is so essential to letting a diamond's full glory shine through.

Although we are constantly surrounded by the phenomenon of light, defining this term is just as hard as defining the idea of "colour", as neither concept is actually a tangible, material substance. Nevertheless, both contribute equally to making Natural Fancy Coloured Diamonds exactly what they are.

Brilliance

White light is made up of different colours, called **spectral colours** (red, orange, yellow, green, blue and violet).

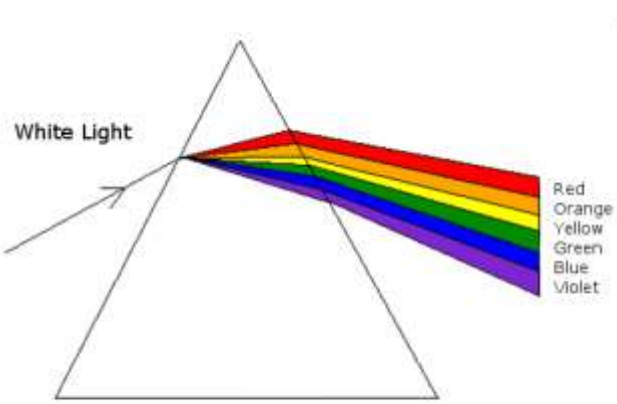
If this light encounters a diamond, its individual colour components separate (dispersion). When the diamond is in motion, a fascinating and beautiful play of colours is created, making the diamond truly unique.

This wonderful and fascinating natural wonder can also be observed when sunlight hits raindrops – a rainbow is created!

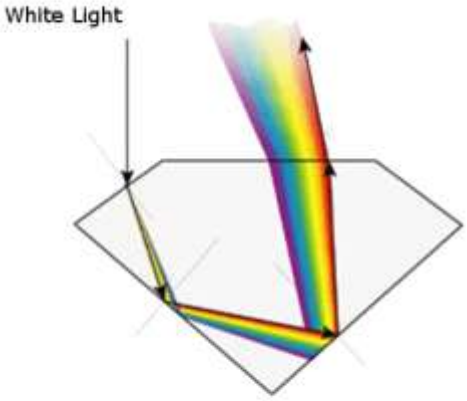
The reason behind a diamond's famous "**fire**" (dispersion) can be easily explained with the simple example of a glass prism:

Light can be of different colours, and therefore of different wavelengths. When it travels

through something else, glass or diamonds, for example, it does so at different propagation speeds. Thus, when light travels through glass, for instance, the propagation speed of the blue light is slower than that of the red light. Consequently, according to the law of refraction, the blue light is more strongly refracted than the red light. Due to the different refraction of the various components of the white light, the light "fans out", forming a spectrum.



Glass Prism



Diamond

Body Colour

In the case of non-luminous bodies, colour appears when the object is lit up by an exterior light source. Certain components of the light are then reflected by the illuminated bodies; others are absorbed or "swallowed".

The proportions of each depend on the chemical properties of the illuminated material. The impression of colour results from the portion of the light that is reflected.

Example: In the case of a tomato, the red colour is caused by the red pigment lycopene which absorbs the green part of the light. Our visual system processes the remaining, reflected light components, creating a sensory perception of red.

Light Colour

The light emitted by light sources has its own inherent colour, the so-called light colour. The light colour (light temperature) is measured in Kelvins (K). A low colour temperature means a warm, reddish light colour. A high colour temperature means a cooler, more bluish light colour.

⩽ 3300 K	3300–5000 K	⩾ 5000 K
Warm White	**Neutral White**	**Daylight White**

1 800 Kelvins: Candle Light - Reddish
2 700 Kelvins: Incandescent Lamp - Yellowish
5 000 Kelvins: Photo Flash - Neutral white
5 800 Kelvins: Midday sunlight - Daylight white

Fluorescent lamps are available in many light colours, especially suited to different visual tasks.

The light colour alone, however, does not provide any information on the **quality of colour reproduction**. Thus, two light sources with the same light colour can have different spectral compositions. The correct spectral composition of light is essential for optimal colour reproduction of the illuminated object.

Colour Reproduction Characteristics of a Light Source

Light sources have different colour rendering properties, and they do not always correctly reflect the colours of the object under consideration. In conventional artificial lighting using fluorescent lamps, only a limited light spectrum is used, which primarily produces brightness. If a spectral colour is missing in the artificial light or if some spectral colours are overly emphasized, there may be a strong deviation from the actual body colour.
Thus, faces can appear to be bleak or vegetables can look unappetizing when viewed under certain colours of light; to cite another, perhaps more relevant, example, Champagne diamonds can appear greyish or colourless if viewed in incorrect light.

Natural, **full-spectrum daylight** is the best light for **maximum colour rendering** of all diamonds, pearls, and coloured stones. Full-spectrum lamps are fluorescent lamps that **represent the entire spectrum of natural daylight almost identically**. The light of the full-spectrum daylight lamps lights up not only in the visible region of the spectrum, but also includes the ultraviolet component in a similar proportion to that of sunlight.

Natural Spectrum of Daylight | Spectrum of a conventional fluorescent tube | Spectrum of a fullspectrum lamp

One **major advantage** of full spectrum daylight that it allows the user to **concentrate better, work longer, and tire less quickly**. When working with conventional fluorescent lamps, the visual centre of our brain must compensate for the missing spots in the spectrum, including the ultraviolet portion which is particularly essential for our well-being.

Working for a long period of time using a "plain" light source creates strain for the eyes due to the additional workload for our brain. As a result, both concentration and well-being decrease.

This information should be of interest for those who spend long periods of time sitting behind a desk or at a workbench!

Note: Colour rendering is evaluated by the index R (a).
The colour rendering index of R (a) = 100 is optimal. Natural sunlight has a colour rendering index of 100. For artificial light sources, it is possible to achieve a colour rendering index of over 90 percent. As a general rule, the lower the index, the worse the body colours are rendered on illuminated objects. The colour rendering index in interior spaces should not be less than 80.

Recommendations for Practice

At **Kulsen &Hennig** and **Dominik Kulsen AG**, we have been working with the **SYSTEM EICKHORST** company for years. They have developed the best light sources for the jewellery industry through decades of research and experience. Good lighting is particularly indispensable when grading and presenting Natural Fancy Coloured Diamonds for the reasons explained above.
We would like to pass on the following recommendations, based on our own experience, to

those who are interested in the topic of "proper lighting". With the right light, not only Natural Fancy Coloured Diamonds but also other coloured stones as well as colourless diamonds, take on a life of their own:

Suitable Light Colours

6 500 Kelvins: The whitest daylight for grading and presenting colourless diamonds as well as white gold, platinum, and silver.

6 000 Kelvins: Very white daylight for all diamonds, white and yellow gold, as well as other precious metals.

5 800 Kelvins: SPECTROLIGHT natural full-spectrum daylight with highest colour reproduction for all diamonds, colour stones, and many kinds of pearls.

5 500 Kelvins: White daylight for all diamonds, colour stones, and most pearls. Best colour contrast for bi-colour jewellery.

5 400 Kelvins: Less white, mild daylight for green, yellow to red gemstones, and pearls.

4 000 Kelvins: Less white light, e.g. for Tourmalines and Tahitian pearls, as well as yellow gold.

The **SPECTROLIGHT full-spectrum daylight** from **SYSTEM EICKHORST** has a natural light intensity corresponding to the average sunlight providing a positive and harmonious sense of light with 5 800 Kelvins. For some applications, however, it can also be useful to use two lamps of different light colours. The resulting mixed colour develops and complements the original light colours of the individual lamps. In this case, a professional recommendation may be helpful.

In our offices, we use a mixed colour of fluorescent lamps from 5 500 to 5 800 Kelvins and 6 000 to 6 500 Kelvins. In our experience, a warmer light colour ensures correct colour reproduction and fluorescent lamps with a cooler light colour ensure optimal brilliance.

If you are interested in receiving a professional recommendation, please contact SYSTEM EICKHORST directly.

You will receive our next newsletter in autumn 2017.

Earlier editions of our newsletter may be found in our newsletter-archive.

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