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What is “good” light?

An interview with Christian Bartenbach – CEO Bartenbach GmbH

RIBAG Licht AG
Kanalstrasse 18
5745 Safenwil, Schweiz

Melania Gehrig
marketing@ribag.com
www.ribag.com

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essence of light

RIBAG

Seite 2



Andreas Richner (l), CEO RIBAG LICHT AG, with Christian Bartenbach, CEO Bartenbach GmbH

Austrian Christian Bartenbach is the second generation to lead Bartenbach GmbH. Around the world, renowned architects and lighting designers are working with the technologies and approaches developed by him and his father for the optimal lighting of interiors. RIBAG is working with Bartenbach GmbH in the area of lighting control. Apart from the unique VIOR lamp, RIBAG is also developing the new SPARK and MILUM collections using lenses and reflector components from Bartenbach. All three lamp collections were awarded a design prize for their design and lighting effect. As well as the manufacture of lamps and their components, Christian Bartenbach is dedicated to researching and developing integrated lighting solutions, focusing on the effects of light on the organism and health. He explains in this interview what this means and how he thinks the development of light may look in the next century.

Mr Bartenbach, what light makes you feel best?

I feel my best in the natural light of a sunny day. In the evening I prefer an accentuated, warm light.

Why does the medium of light fascinate you so much?

It can change the atmosphere of an interior or external space during the day, without the nature of the materials changing at all! Lighting designers, or those producing the light, have a great responsibility - which many don't even realise.

I was exposed to the concept of light at an early age thanks to my father's work. Light is so varied and exciting. At Bartenbach, we have an artificial sky, model construction, development and measurement technology. We experiment a lot and there are always new constructs for studies. Each project is different, so there is never a chance for monotony or repetition.



You work with daylight, artificial light, operating light, film light... What then is "good" light?

It depends on the activity and time of day. Operating light has different requirements to the light for a candle-lit dinner. Good light follows the changes between day and night and is optimised for the relevant needs and activities of

the people. It needs to meet both visual and biological requirements equally. It also needs to create an atmosphere that is comfortable or stimulating for people (depending on the activity) through its interaction with the space and its surfaces.

According to you, if someone wants good light they should follow "integrated" approaches and mindsets. How do you understand "integrated"?

I define "integrated" as the interaction of optimised visual perception processes with physical, technical and design considerations, leading to solutions with a decisive advantage, namely that they contribute to the quality of life.

Your studies have shown that the feeling of comfort is significantly influenced by light. Is this perception not highly individual?

There are of course individual perceptions. However, there are general connections in the ways people react to and perceive light. I like to show this with the "comfort curve" developed by A. A. Kruithof. Kruithof showed that light can be perceived as pleasant or unpleasant depending on the lighting colour and the illuminance. He saw that it was not the illuminance or colour temperature alone which created a pleasant environment, but the combination of the two. This model is applicable to both artificial and natural light. This correlation has been confirmed repeatedly in our studies.

Light is known to have an influence on health. Do you believe a walk in the daylight is enough to stay healthy?

It is important that as much light as possible reaches the eye, preferably in the early or mid-morning. Illuminances are much more intense outside than inside, which is why it is recommended to

spend time outside. For example, 5,000 LUX hours can be reached in one hour on a bright day. There may be little opportunity for an office worker to take a walk in the morning. However, you can walk or ride to work to catch up on your morning light, or spend a break outside. The research project "Repro light" is investigating the positive, stimulatory effect of a new type of office lighting that generates high vertical illuminance at the eye. The series of tests will be complete in the summer and the results will be available in autumn 2020. If the effect is confirmed, as I assume, then we can also provide sufficient light to those reluctant to leave their desks.

In what way does light influence our sleeping and waking phases?

Our day-night rhythm is controlled by light over the long-term. This rhythm should be supported where possible with high intensities of cold lighting colours during the day and low intensities of warm lighting colours in the evening and at night, especially to avoid disorders caused by the suppression of melatonin at night.

What lighting qualities are decisive here?

The illuminance at the eye, the time of day, the light spectrum and the time of exposure. During the day, we need a lot of white light to be able to manufacture serotonin (the "happiness hormone"). The production of melatonin (sleep hormone) begins in the evening or at night: this is suppressed by light that is too white. Light in the evening should therefore be warmer with reduced intensity.

You are recreating natural light at Bartenbach; will people and plants be able to do without sunlight in the future?

We can recreate any natural light spectrum artificially. Crop plants such as

lettuce, cucumbers and herbs are already being grown successfully in "indoor" or "vertical" farms. Modern LED technology even makes it possible to adapt the light individually to the needs of different plants in different stages of development. This can control growth and flavour.

Our studies have shown that the connection to the outside is essential for our well-being and performance. We can of course replace or supplement natural light with artificial light for certain applications and even create highly realistic artificial natural lighting effects, but to live without any natural light - in an artificial world - I wouldn't wish that on anyone.

What effect does the light from screens and monitors have on our organism?

Especially in the evening, shining screens with their high proportion of blue light can lead to suppression of the hormone melatonin. However, the larger problem lies more in the area of psychology and is caused by the permanent state of attention from constantly being online and from concentrated visual tasks on small screens.

We have discussed the different facets of light and its effect on the organism. Let us look now at interior design with light. How can you achieve optimal spatial effects using light?

By having the lamp retreat visually and allowing the interior surfaces to use the light to come to the forefront. Light as a medium is invisible. We only see the light reflected by an object if it enters our eye. The spectrum of the light changes with the re-emission properties of the various materials in the space. The information about the space and its surfaces and materials passes via the light entering the eye into our brain. This is where the images and information are formed about the space, which we then perceive visually.

The knowledge of how we see and process visual information is essential for good light and spatial planning. At Bartenbach, we are more concerned with the interior surfaces and materials that make the light visible. We let the lamp as an object recede to allow the space to emerge. This type of planning takes much more effort as we need to work very intensely with the architects and builders to achieve a good result. Many planners take the easier path of only calculating the illuminances – or the apparent light according to the norm – and completely fail to address the spatial surfaces. However, the results are never the same and unfortunately the quality of a project suffers.

Light is a central component of architecture. Are there planning principles for light that apply to each space independent of the use?

Foremost is the absence of lamp glare, as well as an adequate intensity with the correct lighting colour and good colour rendering for the visual tasks (allowing good vision); light should also support the architecture and spatial perception (design) as well as generate emotional effects. White light should be preferred during the day to supplement natural light, with accentuated, warm light in the evening.

If someone decides to change their lighting, both the economic and ecological impacts are important. Can you actually save electricity with the latest lighting technology? If yes, how much?

You certainly can. An LED uses a tenth of the power of a conventional lightbulb and is around 50% more efficient than a fluorescent lamp. Using the latest technology thus not only saves considerable electricity, there is less impact on the environment owing to reduced heat emissions and the significantly longer service life of the light source.

You have been sharing your knowledge of lighting and your experience with students for 15 years. Which topics interest younger generations the most?

The effect of light on people and the influence of this knowledge on architecture. An example is the development of new building geometries for the optimal integration of natural light. The Messe Basel (Basel Exhibition Centre) in Switzerland comes to mind. We designed the skylight with Herzog & De Meuron to ensure sufficient natural light entered the roofed area via a light-controlling surface; this resulted in a brighter and sunnier natural light area. We developed the form of the opening and materiality with the architects in this project. It is always a collaborative process and cannot function without the willingness of the architects. We want to communicate this understanding for natural light and architecture to young architects.

At your academy you have a room with biologically effective light. Is this to be understood as manipulative?

No. We simply want to supply the eye with a lot of light with the least possible amount of glare to counteract a light deficiency during the day. Daylight should be supplemented with artificial light as naturally as possible in this regard.

You produce innovative concepts. What, for you, is an innovative concept?

Innovative, for example, would be a lens system that only shines through one 8-mm ceiling opening, does not glare and generates room light that meets all the integrated criteria. The lighting system is barely noticeable and the space shines as if by itself. For us it's always about the spatial effects, not just a product. Our products need to generate

a particular effect in the space – that is our claim.

Where do you find your knowledge is applied?

“Our” students run architecture and lighting design studios around the world or are active in the lighting industry. We keep collaborating with them or come across lighting solutions (lighting installations, lamps) where we can recognise their handwork.

They’re no longer able to work to other criteria than the principles set by Bartenbach. However, this is often the case with many long-term customers and architects. Once someone has understood what effect good light can have, they want nothing else.

As the world’s leading light company, you develop components for high-precision lighting control. You developed a completely new microfacet reflector for the VIOR lamps in collaboration with RIBAG. How does such a collaboration look for Bartenbach?

Exciting. RIBAG also places the highest value on qualitative implementation, as Bartenbach does for the lighting technology. As we focus on the (spatial) effect, we develop the optics required. The design is thus not our primary concern – our development partner RIBAG has taken care of this professionally and successfully.

The difficulty in such bilateral development projects is to bring all desires and requirements together, without having to make major compromises. This needs a lot of tact and open dialogue. That was RIBAG’s task and they did it very well.

Bartenbach components are also used in the SPARK and MILUM collections from RIBAG. Are you satisfied with the overall result?

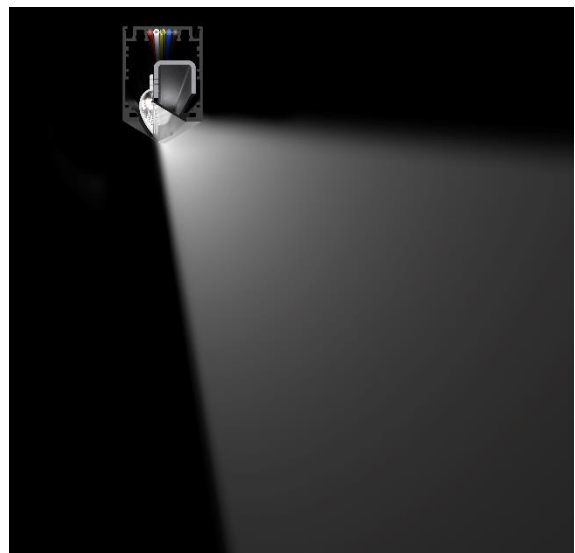
The implementation is truly excellent. But honestly, we would expect nothing less from the Swiss!

How much development time and manpower do such components require?

A lot! For most new and innovative components, you need to feel around and plug a lot of holes. Sometimes our development specialists need to create their own software programs to be able even to start to calculate new facet structures (for example). What I find fascinating personally: they never set limits and never just say “It won’t work”. Innovations can only happen when a team has this attitude. We also have many customers who demand top quality from us.

Technologically, everything is getting smaller and more compact. Do you also see this miniaturisation trend in the area of lights/lighting tools?

It goes in both directions at the same time. Miniaturisation does not always make sense. LED technology has made it possible to provide enormous luminous flux from a small optic. However, the visual comfort then often suffers. The lamps have a high self-luminance and produce glare, or the light pressure is too high as there is too much light



RIBAG

Seite 7

from one spot. People don't like to spend time under such lamps. We don't over-equip small optics and prefer to form clusters, so as to avoid the negative effects. If we need a lot of light from one spot because there's no other way in a project, then we make the system and the optics bigger to reduce the glare and self-luminance. We are currently planning a new reflector series which can be operated at high outputs of 3,500 lm and above. The reflector has a diameter of 80 mm and is thus more compatible with high outputs.

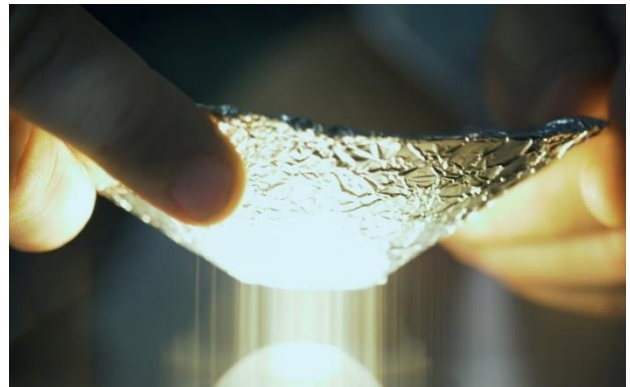
On which innovative projects and technologies are you working at the moment?

On new optics with micro- and nanotechnologies, on biologically effective lighting, on personalised light, on artificial intelligence for control with sensor technology, on the integration of natural light and much more.

Can you distance yourself from the concepts when you are eating in a restaurant or visiting an exhibition privately?

No! I am constantly assessing the light and considering what annoys me and what I would have done differently. Earlier I always had some aluminium foil with me to shade myself from glare. A friend who found this "optimisation" to be particularly good and original for his

wall lamp suffered a burn out of the wall lamp when it overheated. Since the . Since then I no longer do it and have to suffer again.



You are a visionary, so let us cast an eye on the future: under what light will humanity be living in the 22nd century?

Hopefully under the natural light of a healthy planet and, in the interiors, under artificial light that adapts automatically to visual and biological needs. I continue to hope that more people recognise how important light is and not just a tool for showing off the architecture. Therefore I hope that light as a medium is used for well-being, performance and the maintenance of health and that bad light is banned!

RIBAG

Seite 8

Headquarters

RIBAG Licht AG
Kanalstrasse 18
5745 Safenwil
Switzerland

Tel +41 62 737 90 10 (Sales)
Tel +41 62 737 50 01 (Projects)
Tel +41 62 737 50 70 (Service)
info@ribag.com
www.ribag.com