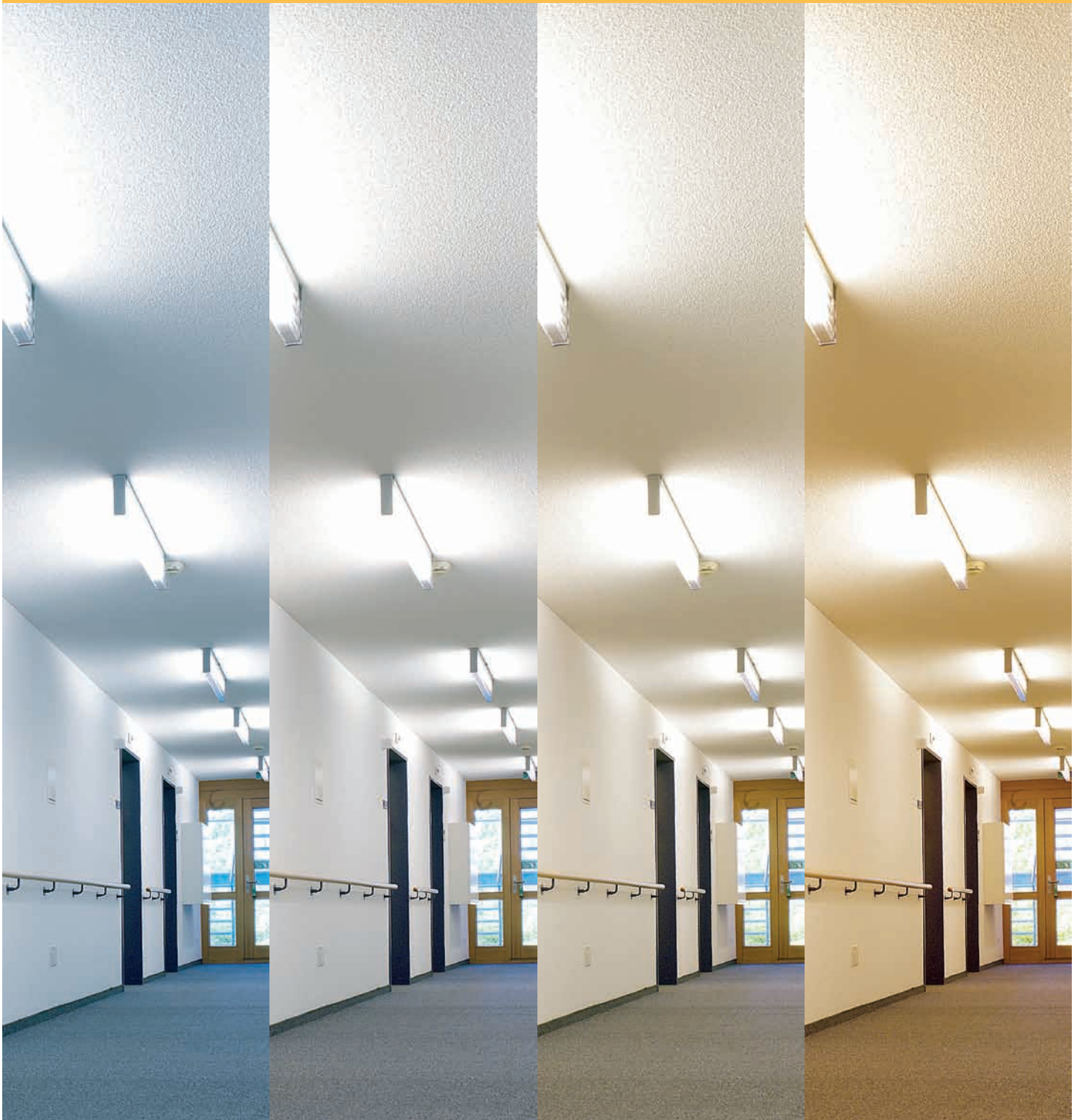


Visual Timing Light

LIGHT FOR HEALTH AND WELL-BEING



VISUAL TIMING LIGHT

WHAT IS THE CIRCADIAN RHYTHM?

The circadian rhythm helps people adjust to their daily environment. It precisely determines processes such as metabolic and hormonal functions, and the sleep/wake rhythm of the human body with amazing time precision.

Interactions Between Light, Human Beings and the Environment

All physiological processes in our body are subject to the rhythm of its internal clock. This program is determined by our genes and synchronized with the 24-hour length of a day defined by the rotation of the Earth. In most cases, our sleep takes place during the dark phase of the day, and hormonal rhythms or the body temperature rhythm show a typical gradient during the course of a day. The internal clock can be influenced by stimuli from the environment, so-called "timers", and thus get out of balance. Light is a key factor as an efficient timer for this

sensitive balance. It serves as a trigger for numerous physiological and psychological processes in the human body and thus has a significant impact on our health and well-being.

Disequilibrium of the Circadian Rhythm

As a consequence of the invention of the electric light and the industrial revolution and globalization, we now find ourselves living against the circadian rhythm of our body. We are moving towards a 24-hour society, with more and more people working on a shift basis. Our bodies have less exposure

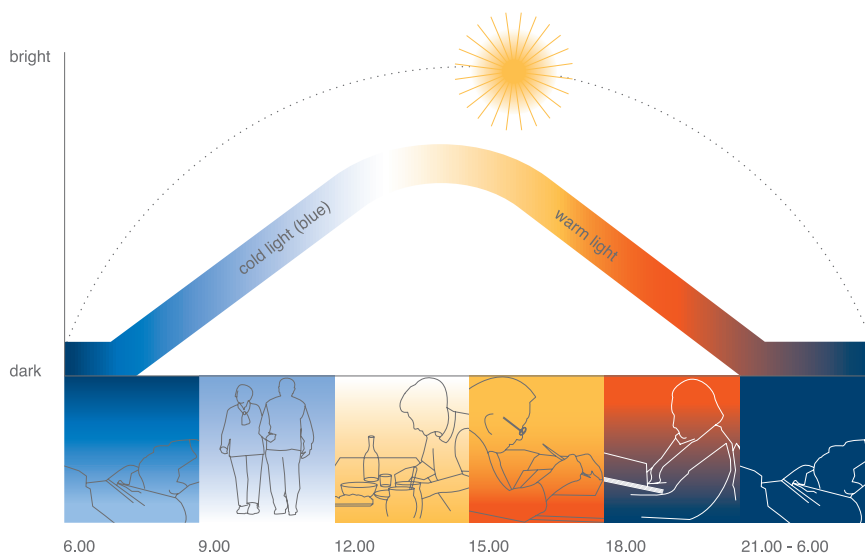
to natural sunlight. During times of mental and physical illness, bad weather, and in certain vocational fields, we spend most of our time indoors in rooms where the light hardly ever reaches an intensity of 500 Lux. Outdoors, we can measure a light intensity of 500 to 10 000 Lux on cloudy days, and intensities of up to 100 000 Lux are reached on sunny days. The influence of light from the environment on our circadian rhythm is therefore strongly reduced.

Benefits of an optimally adjusted internal body clock

- Support in keeping regular daily routines
- Day-night cycles of the human body are kept in balance
- Control of hormonal processes
- Regular sleep/eating habits
- Enhances spirits and well-being
- Compensation of mood swings and depression
- Activates the senses
- Improves physical and mental well-being and concentration

Example: Light as the master clock for regulating the hormonal balance

The levels of cortisone in the blood rise in the morning in order to prepare the human body and spirit for the activities of the coming day. At the same time, melatonin levels sink, causing sleepiness to decrease. The increase of melatonin levels in the evening prepares the body for the sleep cycle and ensures good-quality sleep throughout the night. In particular, the day-night cycle of dementia patients tends to fall out of synchronization. The targeted use of light can contribute towards an optimal regulation of activity and sleep patterns.



VISUAL TIMING LIGHT

CONTROL OF THE DAILY LIGHT RHYTHM

The biological action of light takes place through the eyes. An optimal lighting solution allows replacing the natural luminous pulses even in the absence of sunlight. Our sleep/wakefulness rhythm is preserved.

Circadian rhythm in the right light

When we cannot benefit from natural sources of daylight to synchronize our internal clock, lighting concepts suitable for replacing natural light are of primary importance.

In particular with residential and nursing homes designed for elderly people, the targeted use of light, is an efficient means of maintaining the quality of life for people in need of care. Research has shown that many dementia patients have problems adjusting to the time of day. Listlessness, confusion and mood swings are the con-

sequences of this problem.

The innovative light management system Visual Timing Light manufactured by Derungs Licht AG allows for the simulation of the 24-hour light sequence from sunrise to sunset and during the night by means of artificial light. The implementation of this state-of-the-art daylight tracing system in recreational areas and corridors helps patients to structure their regular daily routine, whereas private rooms provide options for the adjustment of light to individual requirements.

Control of the daily light rhythm

Via a special light control system, you can define different lighting scenarios, e.g. for wake-up times, morning, noon, afternoon, evening and night. Each lighting scenario features an individual light intensity and color. The various scenarios are repeated in cycles of 24 hours in order to simulate smooth daylight tracing with appropriate colors and brightness. Visual Timing Light is an indispensable trigger for the circadian rhythm of our body.

Light in different colors to enhance spirits and well-being

Our state-of-the-art Visual Timing Light concept provides for a smooth transition from cold white light in the morning to mixed light at noon through to warm white light in the evening hours. The use of cold white light with a high degree of blue in the morning has a stimulating and refreshing effect, whereas warm light provides for a cozy atmosphere in the evening.

The specific adjustment of lighting to nursing hours has shown very positive results. Seasonal changes, such as winter and summer time, can be compensated in

order to optimally support nursing routines. Light brings rooms to life and highlights the architecture of rooms and buildings. The use of light in different colors is an efficient means of influencing the atmosphere in a room. Carpets, walls, pictures and shapes have a different effect when illuminated in distinctive colors. For example, cold white light can highlight objects in blue, violet and green colors, whereas warm white light highlights different tones of red, yellow and orange. The combination of color temperatures ensures that the human eye perceives all colors with the same intensity.

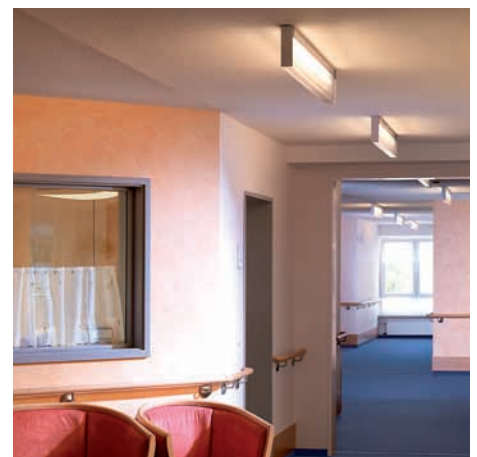
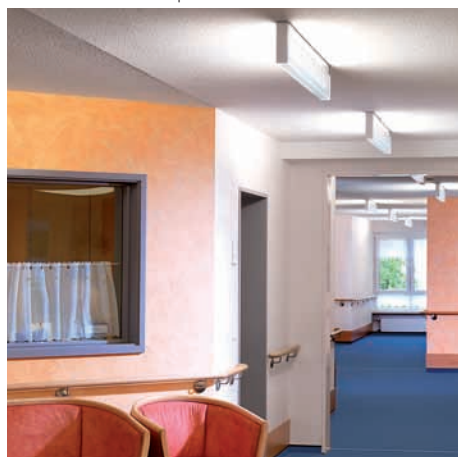
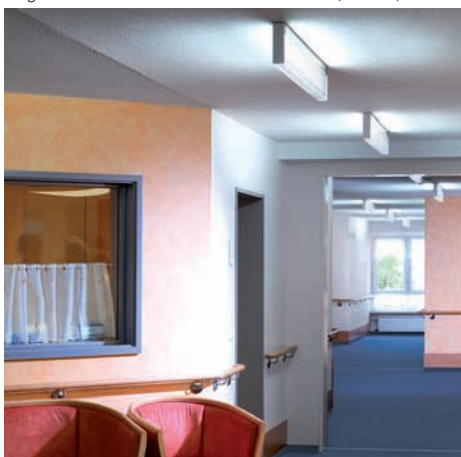
Effects of different color temperatures in interior design



Color tones highlighted through cold white light

Color tones highlighted through warm white light

Light influences the effect of dimensions, colors, materials and the overall atmosphere of a room.



EXPERIENCE AND TESTIMONIAL

Light brings rooms to life – Visual Timing Light

Field report

Conversion of the nursing home "Am Bruderwald" of the Bavarian Red Cross (BRK) in Bamberg, Germany
 Conversion of the nursing home of the Bavarian Red Cross (BRK) "Augsburg-Haunstetten" in Augsburg, Germany

Project: The conversion of a ward in a residential section for dementia patients also involved changes with regard to the lighting system. A light intensity of up to 60 Lux was measured on the floors of the building. Our objective was to increase the light intensity to 500 Lux (cylindrical illuminance at eye level) and to structure the regular daily routine of elderly patients through the use of the Visual Timing Light management system.

Statements upon completion of the project

Mrs. Angela Wiech, interior designer
 Mr. Schmitz, director of the nursing home "Am Bruderwald" of the Bavarian Red Cross (BRK) in Bamberg, Germany
 Mrs. Rehnig, manager of the nursing home of the Bavarian Red Cross (BRK) "Augsburg-Haunstetten" in Augsburg, Germany

- Improved orientation through brightness without glare
- Gathering together of elderly residents in recreational areas and lounges – stimulation of social contacts, contributing towards an improved atmosphere in the facility
- Reduction of shadow and mirror effects – more security and less injuries by falling
- Relatives, visitors, staff and residents describe the new lighting concept as pleasant, stimulating and comfortable

- Proper illumination optimally highlights colors and materials
- The new lighting concept significantly improves the acceptance of areas without daylight exposure through windows
- Optimized perception of rooms through the targeted use of light
- Existing electrical boxes can still be used
- In retrospect, the costs for a control system for the simulation of light adjusted to the course of day have proven to be a smart, worthwhile investment

Statements of numerous managers of residential and nursing homes:

- Significantly improved articulation of dementia patients
- The increased independence and mobility of residents inside the facility eases the workload of the nursing staff

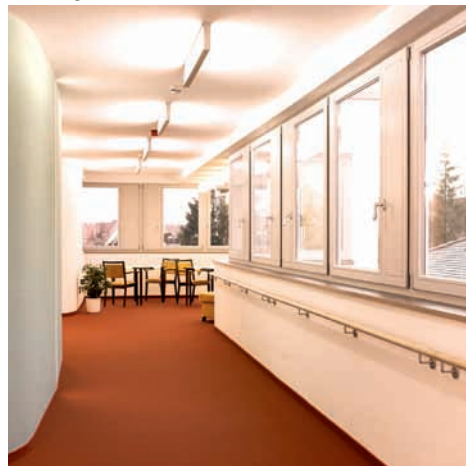
Morning



Noon



Evening



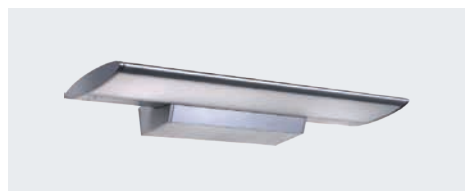
PRODUCTS



D-lite® vanera High-End 54/54 C



D-lite® vanera High-End 39/39 W



D-lite® amadea 2x39 W

Literature

- Till Roenneberg, Institut für Medizinische Psychologie der Ludwig-Maximilians-Universität München (Institute of Medical Psychology, Ludwig Maximilian University, Munich), Germany, "Das rhythmische Auge der inneren Uhr"
- Gerrit J. van den Beld, "Licht ist der Zeitgeber für die biologische Uhr"
- Christian Cajochen, Chronobiology Division, Psychiatrische Universitätsklinik Basel (Psychiatric University Hospital, Basle), Switzerland, "Schlafstörungen bei Schichtarbeit und Jet Lag und die Rolle der inneren Uhr"