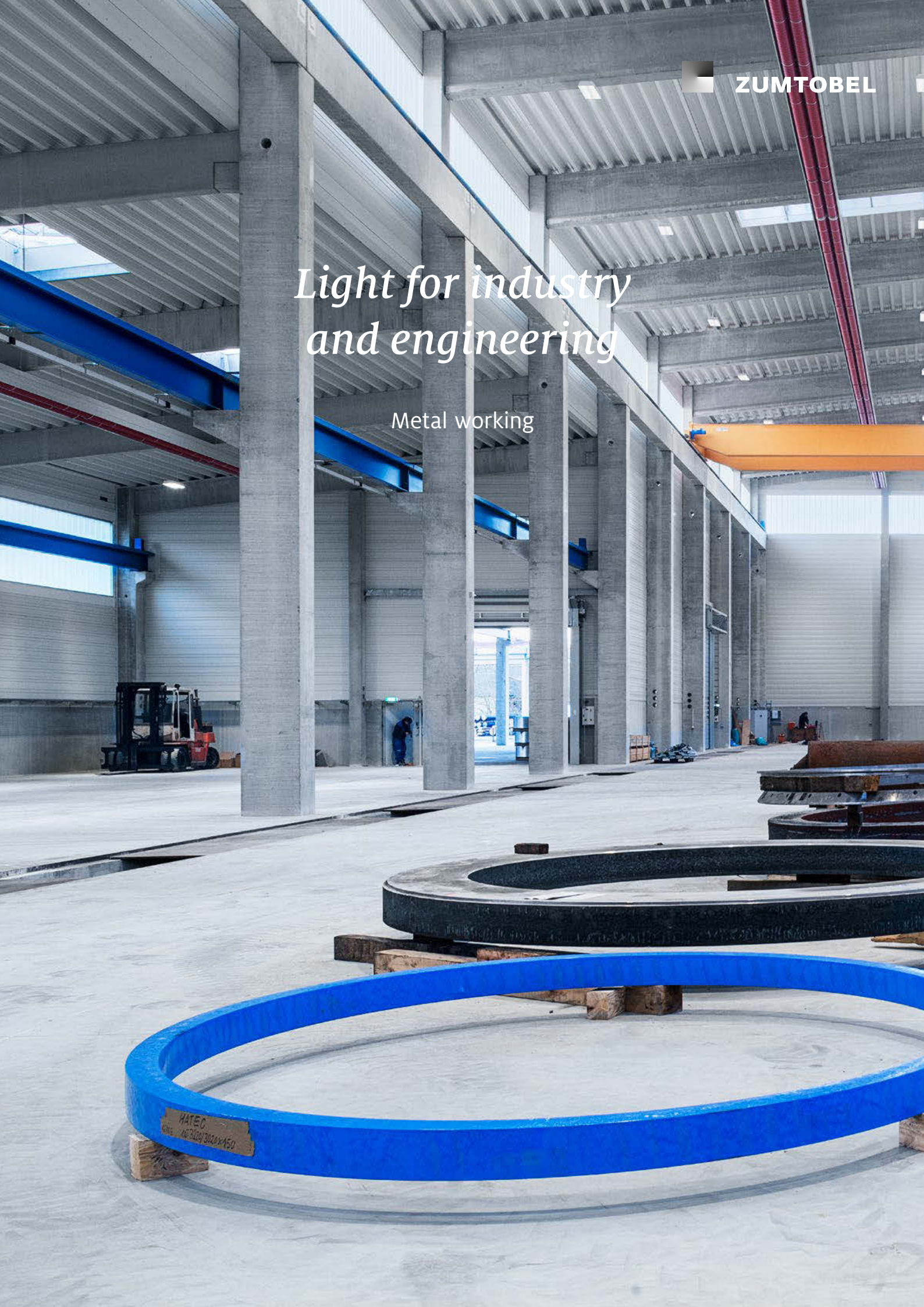


*Light for industry  
and engineering*

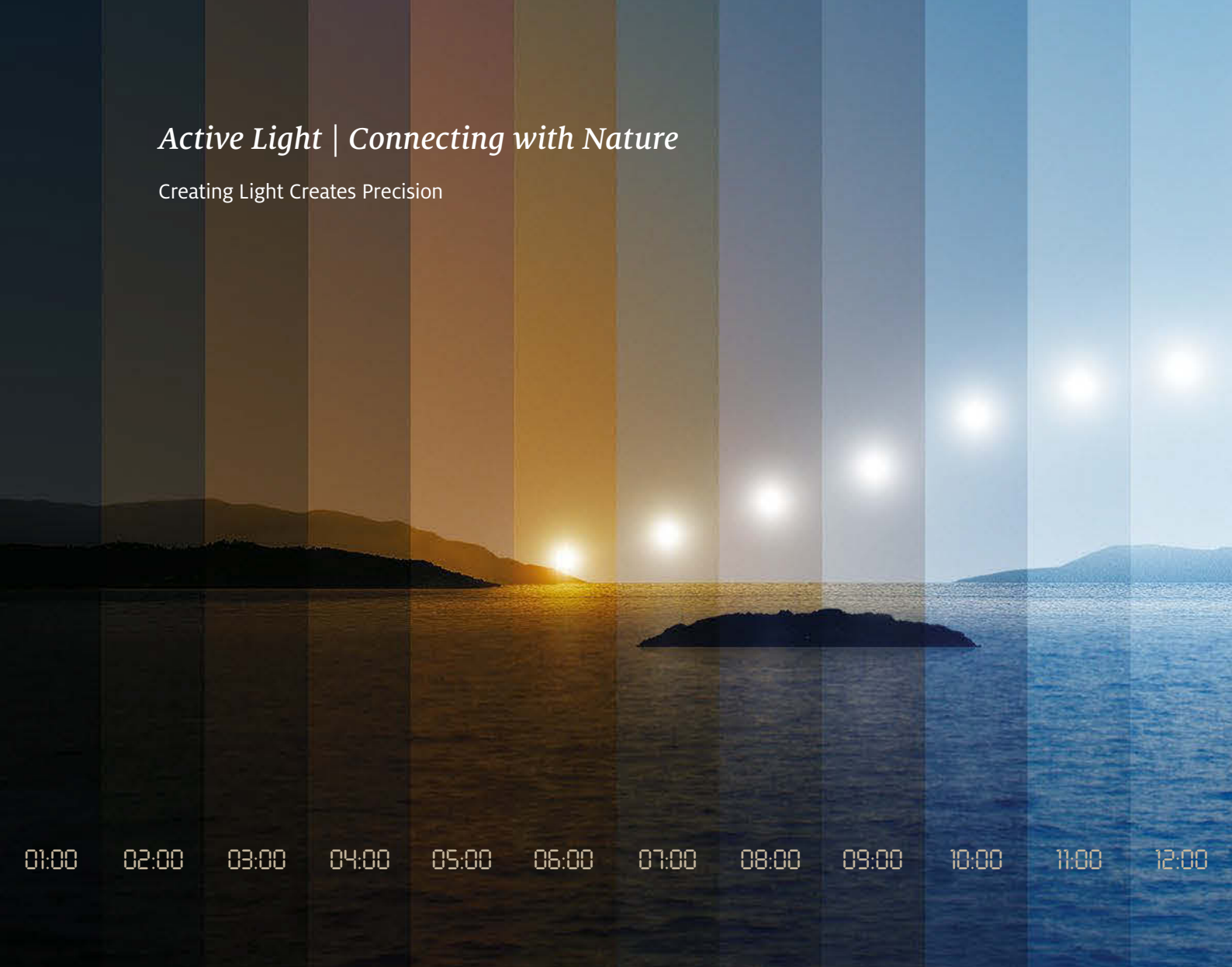
Metal working





## *Active Light | Connecting with Nature*

Creating Light Creates Precision



*Active Light in industry is as unique and dynamic as the employees, the processes and the layout of different production halls. Human Centric Lighting puts the focus of the lighting design firmly on the individual. Visual, emotional and biological needs are fully supported by a blend of Active Light and additional workplace-oriented lighting for work during the day and the night. This approach also facilitates accurate working and improved quality. Pioneering lighting solutions with Activity-Based-Lighting use innovative sensor technology to automatically adapt to the specific situation.*

See here how Active Light works:  
[zumtobel.com/activelight](http://zumtobel.com/activelight)



#### **Intensity**

Dynamically adjusted lighting levels help employees with their regular visual tasks. Active Light helps reduce error rates and increase worker safety.



#### **Direction**

Uniform and shadow-free illumination minimises glare – even with glossy surfaces. Adjusting the direction of the light towards the visual object with Active Light enhances quality. Precise work is promoted and fatigue is simultaneously kept to a minimum.



#### **Colour**

Active Light means tailoring light colours to reflect age, user preference and working hours, increasing wellbeing and boosting employee productivity.

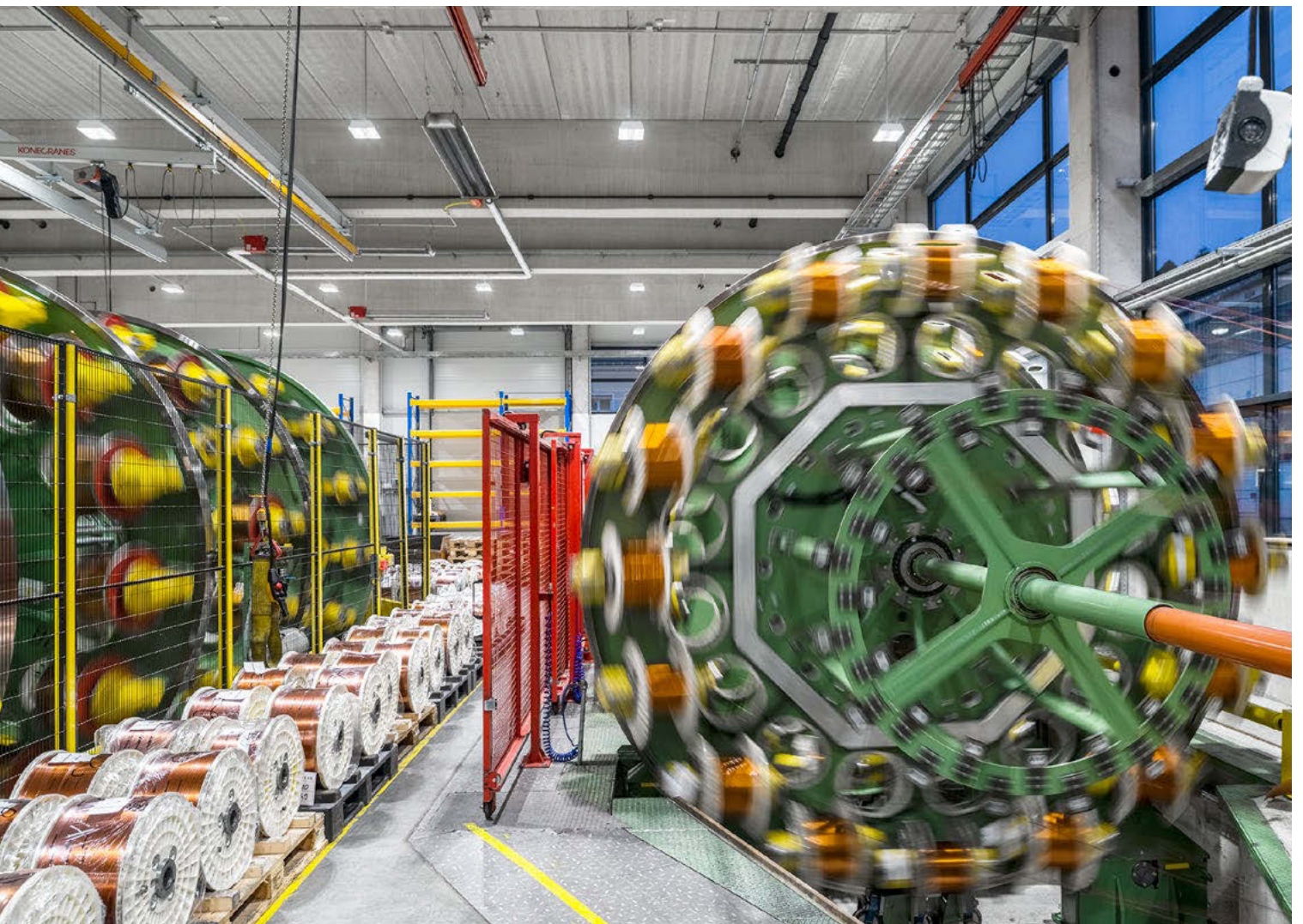


#### **Time**

Artificial light based on the natural course of the day helps support the internal clock. Luminaires controlled by sensors, which only switch on when light is required, reduce costs and minimise energy consumption.



**ASTA Elektrodraht (electrical wire) GmbH, Oed | AT**  
Electrical contractor: Auer & Ofenluger GmbH, Weiz | AT



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<b>Lighting quality</b>	Changing visual tasks Minimise glare caused by reflection	6 – 9
<b>Resistance</b>	Tough against oils and emulsions Higher degrees of protection	10 – 13
<b>Cost-effectiveness</b>	Easy installation and maintenance Minimise energy consumption	14 – 17
<b>Flexibility</b>	Changing production processes Sample solution with ATIVO multisensor	18 – 21

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## *Lighting quality*

- **There are a wide range of visual tasks in the metal industry.**
- **Bright and shiny surfaces place particularly high requirements on the lighting.**
- **Uniform illumination with as few shadows as possible is essential for concentrated working.**

Optimum lighting should never be underestimated in the working world. Industrial luminaires from Zumtobel ensure perfect lighting conditions in compliance with EN 12464-1 for a variety of different situations, whether for larger visual tasks or detailed inspection work. They can even effectively counteract irritating glare on highly specular materials. The benefits of the right lighting for a company and its employees are undeniable. It reduces errors, increases commitment and minimises the risk of injuries – important factors that ultimately decide the performance of the employees and therefore the quality of the final product. Shift workers and older employees also profit from lighting that adapts to the natural rhythms of the body and the increased demand for light as sensitively as possible.







## Lighting quality

Changing visual tasks

*“We take care of everything from rough assembly to soldering operations in one hall. So who should the lighting please?”*

You will find a matching optic and performance level for the wide variety of visual tasks in the metal industry.

Several stages of production are strung together in a confined space in numerous production halls. The lighting therefore has to be able to provide optimum lighting conditions for several different situations. Remember: The more complex the work, the higher the requirements. A luminous intensity of 200 lux is adequate for rough assembly and forging work. Welding and medium-fine machine work need at least 300 lux. Precision work that calls for maximum concentration requires both a high light intensity and uniform lighting to minimise harmful glare. Luminaires with an opal diffuser such as TECTON MPO are ideal in this case.

### Product recommendation

CRAFT M | LED high-bay luminaire |  
85 to 90% luminous flux after  
50 000 hours of operation



CRAFT S | LED high-bay luminaire |  
85 to 90% luminous flux after  
50 000 hours of operation



Type of indoor area, task or activity  
Excerpt from EN 12464

Metal working and processing	Em	UGRL	UO	Ra
Open-die forging	200	25	0.6	80
Drop forging	300	25	0.6	80
Welding	300	25	0.6	80
Rough and average machining: tolerances $\geq 0.1$ mm	300	22	0.6	80
Precision machining, grinding: tolerances $< 0.1$ mm	500	19	0.7	80
Scribing, inspection	750	19	0.7	80
Wire and pipe drawing shops, cold forming	300	25	0.6	80
Plate machining: thickness $\geq 5$ mm	200	25	0.6	80
Sheet metal work: thickness $< 5$ mm	300	22	0.6	80
Tool making, cutting equipment manufacture	750	19	0.7	80
Standard bookbinding work, e.g. folding, sorting, gluing, cutting, embossing, sewing	500	22	0.6	80
Fuel supply plant	50	-	0.4	20
Boiler house	100	28	0.4	40
Machine halls	200	25	0.4	80
Side rooms, e.g. pump rooms, condenser rooms etc.; switchboards (inside buildings)	200	25	0.4	60
Control rooms	500	16	0.7	80
Cutting, gilding, embossing, block engraving, work on stones and plates, printing machines, matrix making	500	19	0.6	80
Paper sorting and hand printing	500	19	0.6	80
Type setting, retouching, lithography	1000	19	0.7	80
Colour inspection in multicoloured printing	1500	16	0.7	90
Steel and copper engraving	2000	16	0.7	80
Assembly: rough	200	25	0.6	80
Assembly: medium	300	25	0.6	80
Assembly: fine	500	22	0.6	80
Assembly: precision	750	19	0.7	80
Galvanising	300	25	0.6	80
Surface preparation and painting	750	25	0.7	80
Tool, template and jig making, precision mechanics, micromechanics	1000	19	0.7	80



## Lighting quality

Minimise the glare caused by reflection

*“Bright light dazzles my employees when they look at the object they are working on.”*

A high selective luminance can cause glare, so this needs to be carefully avoided.

Metals with highly specular surfaces tend to reflect light and cause irritating glare. This effect frequently occurs with high-pressure discharge lamps. In principle, uniform light distribution should be prioritised over high luminance. Light lines are recommended for rooms up to six metres in height whereas high-bay luminaires are a sensible option for higher halls. There are also ways to counteract reflections with different types of installation. The light can be distributed over wide areas if the luminaires are mounted to the side of and parallel to assembly lines. Additional workplace lighting should be considered for employees who have to wear safety glasses or goggles.

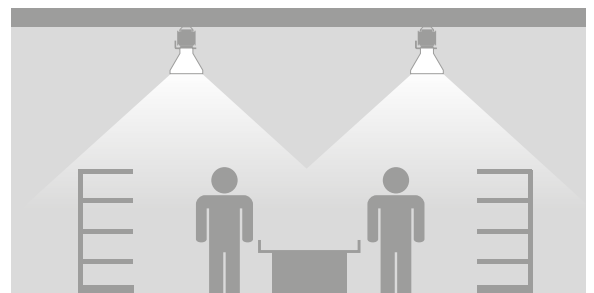


A uniform luminance is important for test and inspection work on products with shiny surfaces.

### Product recommendation

TECTON MPO LED | continuous-row luminaire | 90% luminous flux after 50 000 hours of operation

SCUBA LED |  
Moisture-proof luminaire



Light lines arranged on the right and left of the assembly belt prevent irritating glare.

## *Resistance*

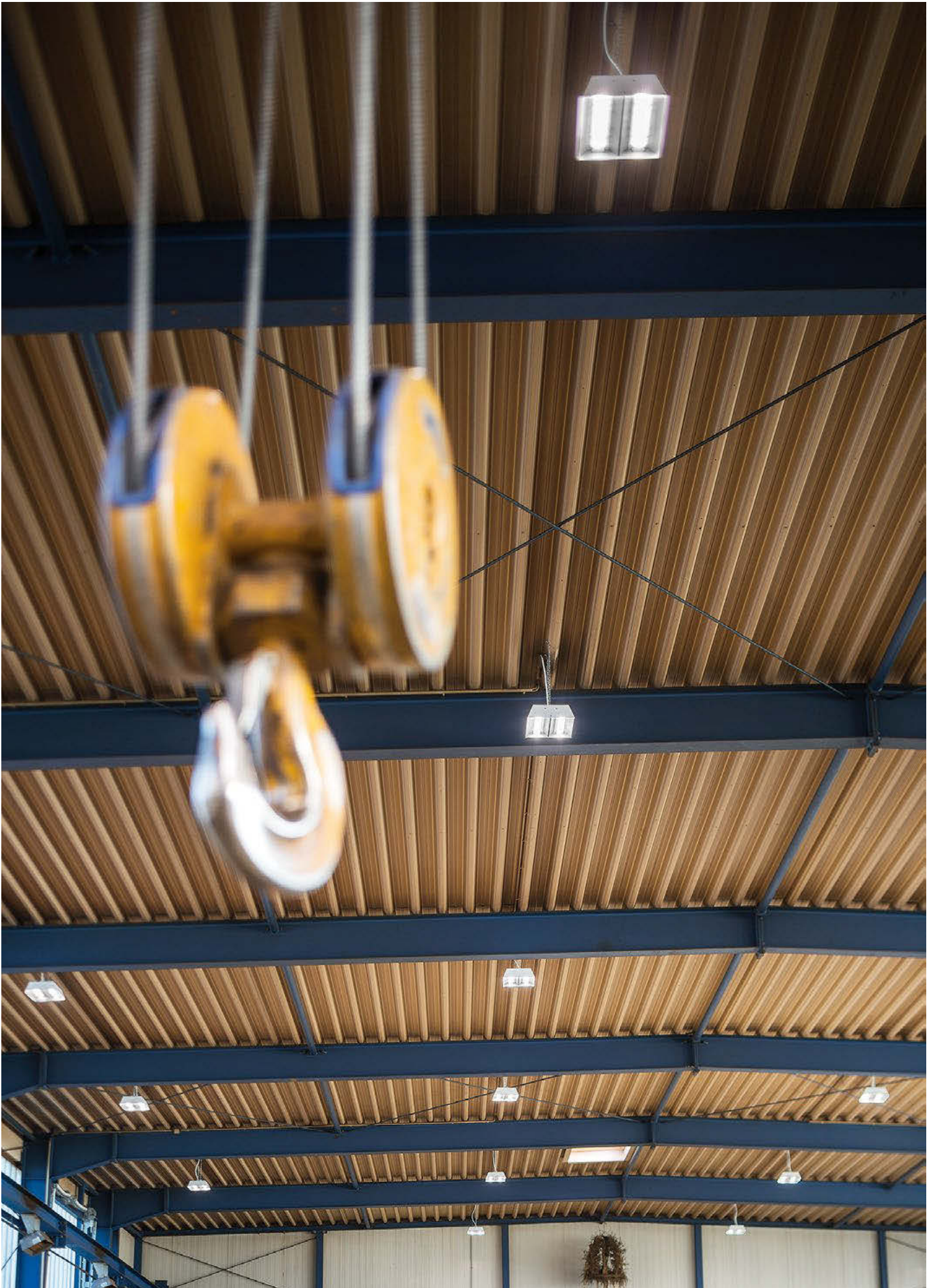
- **Dirt, oils and lubricants put the component materials of a luminaire through their paces.**
- **Rough environments call for a higher degree of protection.**
- **The frequency and ease of luminaire cleaning is closely related to the surface design.**

Industrial luminaires have to resist dust, oils and lubricants every day, particularly when it comes to metal working. However, often the height of the applications means that they are rarely cleaned. As a result, the luminaires have to rely on special design principles and materials if they still want to provide an optimum performance in demanding environments. It goes without saying that industrial luminaires from Zumtobel have a higher degree of protection. Specially designed surfaces make it hard for dirt and foreign bodies to stick to them, reducing the cleaning work to a minimum. Luminaires made of PMMA are also resistant to aggressive cleaning agents, oils and lubricants.

**Hildebrand Stahlbau (steel construction) GmbH, Ellerbek | DE**  
Electrical installation: Schröder Elektrotechnik e.K., Rellingen | DE







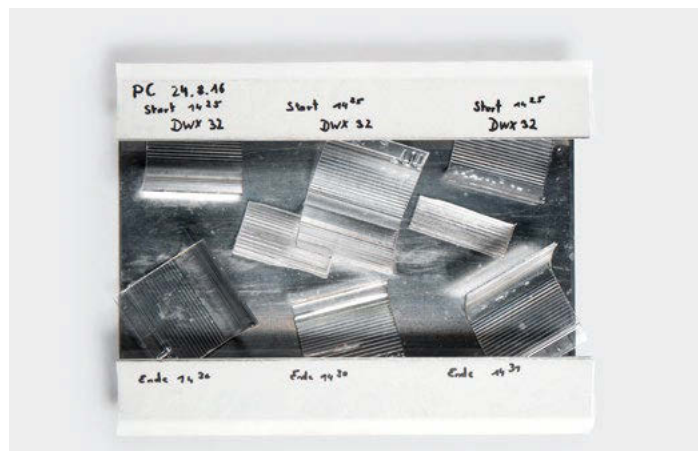
## Resistance

Tough against oils and emulsions

*“The air contains oils and lubricants.  
Lighting that is not robust represents a safety risk  
for my employees.”*

Resistant materials such as PMMA protect the luminaire and the people.

Sturdy luminaires are indispensable in a demanding environment. Without special surfaces and careful workmanship, there is a risk that foreign bodies like drilling coolants, grinding dust, oil vapours and flying sparks could penetrate and damage the inside of the luminaire. At the same time, greases, lube oils and coolants take a lot out of the housing. Resistant materials such as PMMA offer maximum protection for reliable operation over longer periods with no maintenance. Polycarbonate, on the other hand, should not be used. If this comes into contact with oil and lubricants there is a risk that it will soon break.



Material test at Zumtobel: Polycarbonate breaks after only a few minutes of contact with oils or lubricants.

### Product recommendation

CRAFT PMMA | LED high-bay luminaire |  
85 to 90% luminous flux after  
50 000 hours of operation



TECTON | LED continuous-row  
luminaire | 90% luminous flux after  
50 000 hours of operation



### Material recommendation

PMMA polymethyl methacrylate

Shock-resistant polymethyl methacrylate (PMMA) is used for the UV-resistant and chemical-resistant Zumtobel luminaires. Its mixing ratio has been optimised so that the luminaire achieves maximum efficiency with a homogeneous appearance.

CHEMO

Zumtobel is the only supplier who offers luminaires with a diffuser made from high-quality CHEMO material. This is UV-resistant, impact-proof and highly resistant to chemical influences.



# Resistance

Higher degrees of protection

*“The environment is dusty and dirty,  
but I can’t clean the lighting all that often.”*

Higher degrees of protection and carefully designed surfaces minimise deposits.

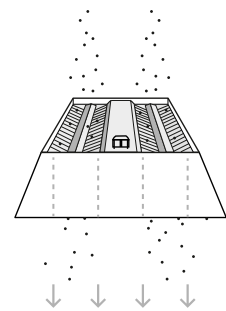
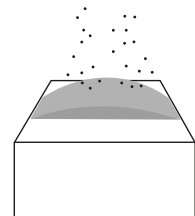
If dirt and dust accumulates on a luminaire, it can heat up faster and therefore reduce the lamp life. A clever surface design works against dust deposits from the very start – banishing the risk of overheating and minimising expensive and complex maintenance work. Higher degrees of protection prevent the unwanted penetration of solids and liquids. The CRAFT high-bay luminaire is a perfect example of innovative surface and product design. The luminaire is not completely closed, allowing the passage of air alongside every optical unit. As the hot air rises, the chimney effect blows the dust out of the luminaire.



**The CRAFT high-bay LED luminaire is protected against overheating thanks to a chimney effect and the fact that dust cannot accumulate on the luminaire.**

Conventional luminaire

CRAFT



**Product recommendation**

CRAFT PMMA | LED high-bay luminaire |  
85 to 90% luminous flux after  
50 000 hours of operation

SCUBA LED PMMA |  
Moisture-proof luminaire



## Cost-effectiveness

- **The higher the hall, the greater the benefit of an easy-to-install, maintenance-free luminaire.**
- **Lighting management and the matching optic ensure that visual tasks are solved efficiently.**
- **Lighting management saves as much energy as possible.**

Machines that work independently and zones without people do not need any light. Luminaires that switch themselves on and off as required offer significant benefits in terms of energy costs and dependability. An intelligent lighting control system is the optimum solution. This adjusts the light intensity to suit the specific visual task, avoiding any unnecessary power consumption. Complicated cleaning and maintenance work also incur high costs, particularly in a dusty environment. LED luminaires with a higher degree of protection are less sensitive and can operate for long periods without any maintenance. If luminaires have to be extended or replaced, the easy installation and high flexibility of rail-mounted systems make them the ideal solution.



**Seeger Präzisionsdrehteile (precision turned parts) GmbH, Salem-Neufrach | DE**  
 Architects: Planquadrat Gaiser & Partner MBB, Sigmaringen | DE  
 Electrical contractor: Planungsbüro Fiegl, Baienfurt | DE  
 Electrical installation: Schwägler Elektrosysteme e.K., Frickingen | DE







## Cost-effectiveness

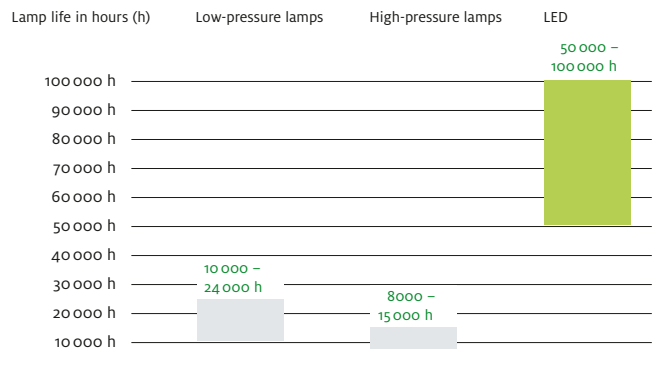
Easy installation and maintenance

*“I need a service lift for the maintenance of the luminaires. That's complicated, takes up space and interferes in production.”*

### LED luminaires are long-life and almost maintenance-free

The lighting in high halls is usually difficult to reach. This makes any cleaning and maintenance complicated and expensive. Industrial luminaires from Zumtobel have been specially designed for demanding environments – and you can be certain that the higher degrees of protection also extend the maintenance intervals for the lighting. Even the smallest details have been optimised to deliver a long lamp life with the lowest possible drop in luminous flux. Optics that have been carefully planned for various industrial applications also guide the light to exactly where it is needed, helping to improve efficiency even further. No matter which optic is in use, the external appearance of the luminaire always remains the same.

Lamp life



### Product recommendation

TECTON |  
Continuous-row lighting system





# Cost-effectiveness

Minimise energy consumption through lighting management

*“Electricity is expensive and the lighting is on almost around the clock.”*

Lighting management guarantees that the lighting is only switched on when and where it is needed.

Nowadays, machines often take care of a large part of production. The advantages are that they work continuously and completely independently. This leaves humans free to concentrate on inspection and maintenance tasks, but this also means that a room does not have to be constantly illuminated with a high intensity. Presence control ensures that the lighting is only switched on when it is actually required. Flexible luminous intensities based on the particular situation also help reduce costs and save energy. The daylight that is present can also be integrated efficiently into the lighting solution.

### Product recommendation

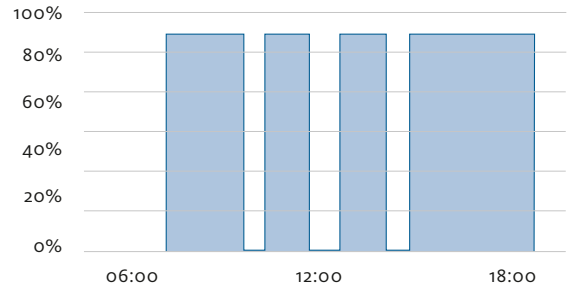
CRAFT PST |  
Infrared motion sensor



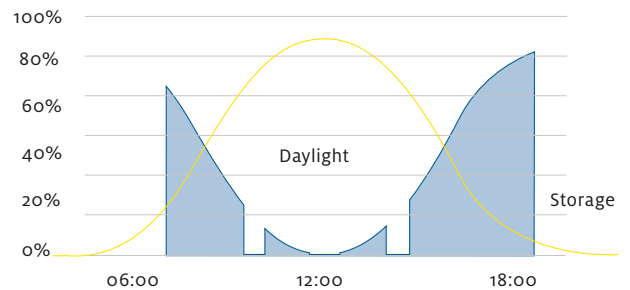
TECTON | daylight sensor |  
DALI light sensor for detecting the amount of daylight entering the room



Energy saving delivered by flexible illuminance and presence detection



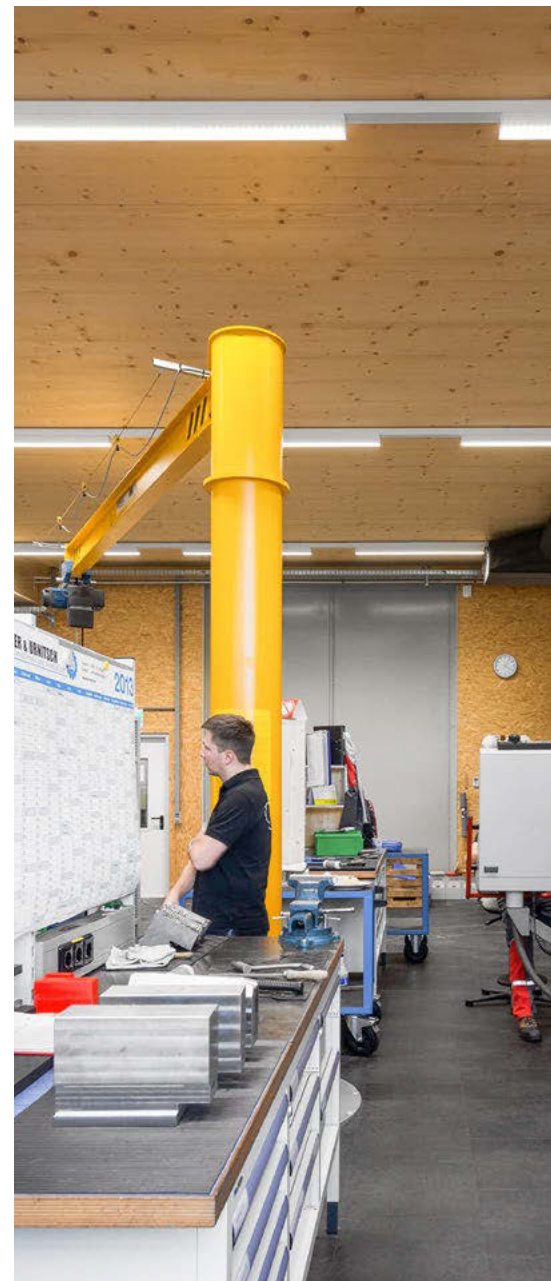
Energy saving delivered by the additional integration of daylight linking

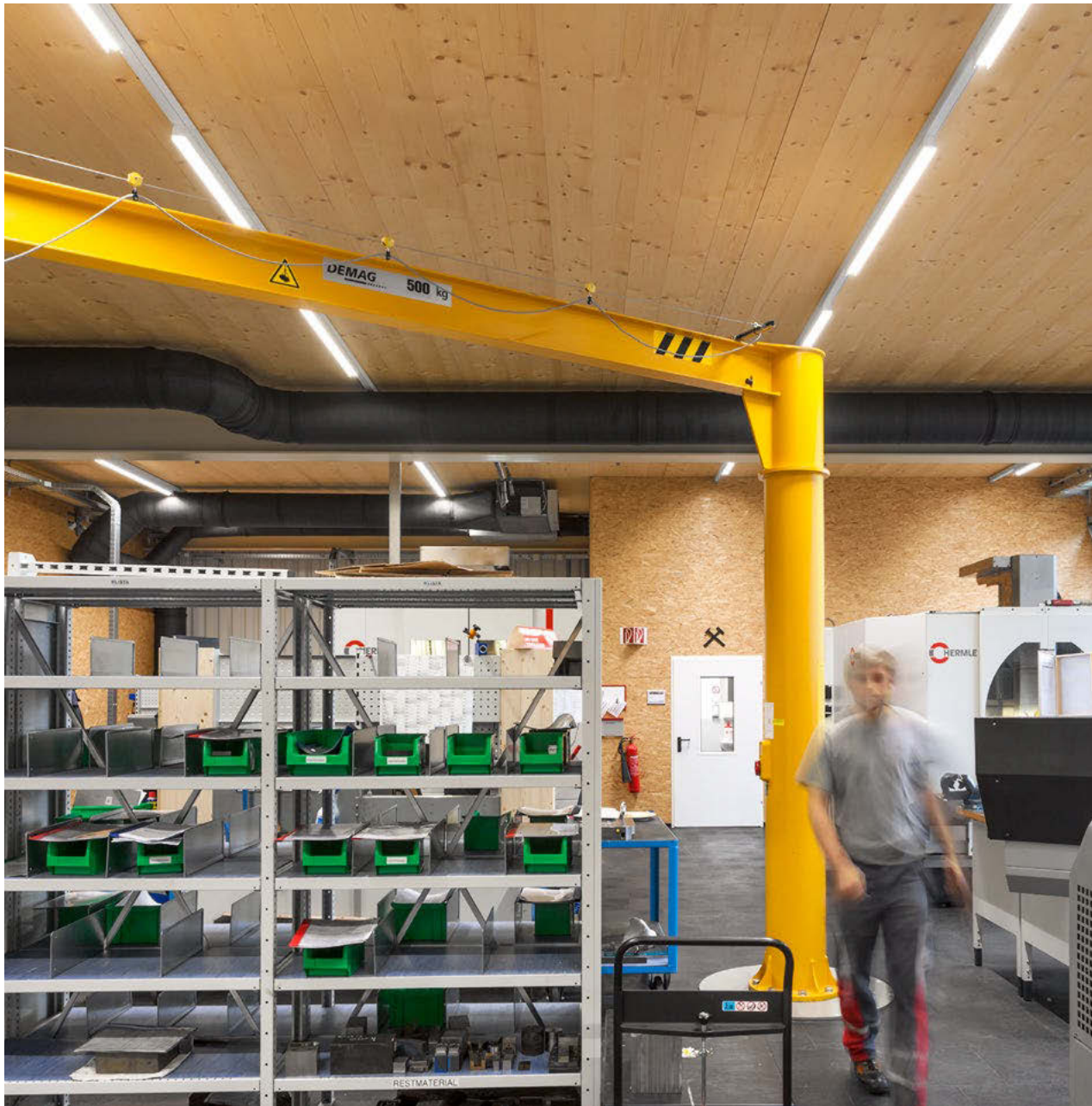


## Flexibility

- If workplaces or machines are rearranged, the demands on the lighting change too.
- Lighting management adjusts the light flexibly.
- The costs and time needed are low and employees benefit from optimum visibility conditions.

Modern industrial lighting has to offer more than just a supply of inflexible light for workplaces or rooms. This is because the different activities are rarely carried out for the duration of the luminaire lamp life. If there are changes in the layout or function of an application, new lighting conditions are needed. Trunking systems allow you to adapt the position and number of luminaires quickly and easily to reflect the latest requirements. A lighting system that has been combined with a lighting management saves time and money during changes and adjustments, while employees also benefit from the best possible visual conditions at all times.







## Flexibility

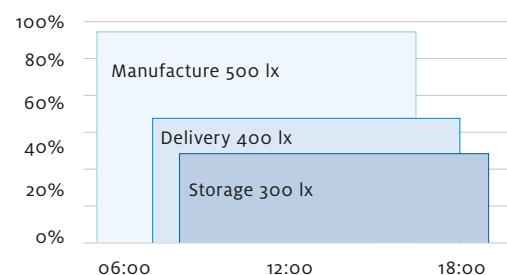
Changing production processes

*“Constantly changing production tasks mean that we have to repeatedly reorganise the production hall. How can I make sure that the lighting fits these changing requirements?”*

Trunking systems, different optics and a software-based adjustment make lighting future-proof.

Constant development of production processes and varying production tasks demand a lighting system that responds as flexibly as possible to change. Continuous-row lighting systems are the perfect solution for such cases. Existing luminaires can be moved or supplemented with additional elements as required. A wide range of optics brings additional flexibility. The latest generation of multisensors can detect both daylight and movement. In addition, it is also now possible to precisely define several detection areas and programme different brightness values. In combination with a lighting management system, this means that rooms can be split into zones for particular activities and illuminated according to the specific requirements.

Energy saving delivered by flexible illuminance



### Product recommendation

ATIVO | Multisensor



LITECOM | Lighting management

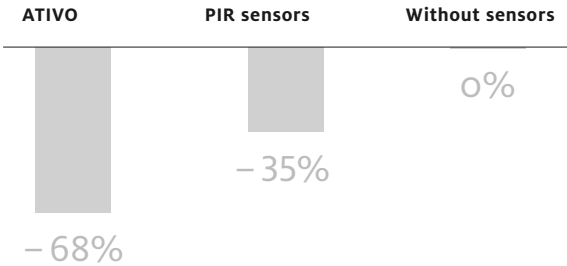


# Flexibility

Example solution with ATIVO multisensor

The innovative ATIVO multisensor integrates existing daylight, keeps the defined level of light constant and detects moving objects. The greatest strength of ATIVO lies in the almost free arrangement of the rectangular detection zones, with up to five zones possible for each sensor. Subsequent changes to the layout or function of the room can be realised quickly and efficiently. High-bay sensors have been developed for room heights up to 20 metres, while a robust IP64 housing provides the necessary resilience for industry applications.

### Energy saving



### Example comparison

#### Conventional:

7 PIR sensors (passive infrared)

- Detection range dependent on installation site
- Usually only imprecise demarcation due to mechanical shading

#### With ATIVO contrast sensors:

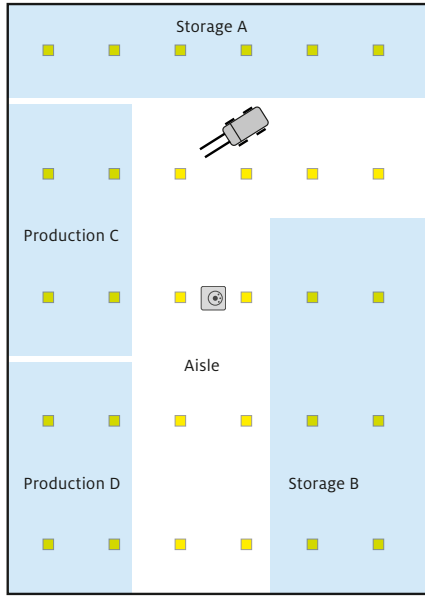
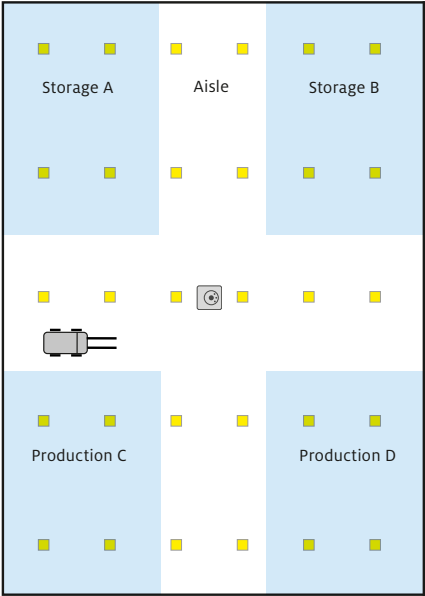
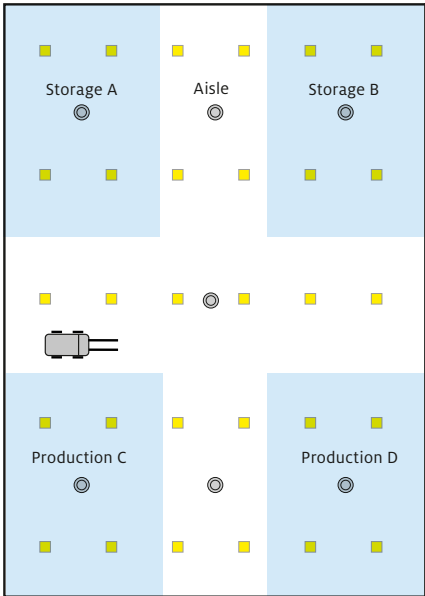
1 ATIVO sensor

- Significantly lower installation costs
- Up to 50% higher energy saving thanks to presence and daylight integration
- Maximum flexibility for changes to the room layout or function

#### Change in layout:

1 ATIVO sensor

- No installation costs
- Zones redefined by software
- Maximum flexibility



Zumtobel, a company of the Zumtobel Group, is an internationally leading supplier of integral lighting solutions for professional indoor and outdoor building lighting applications.



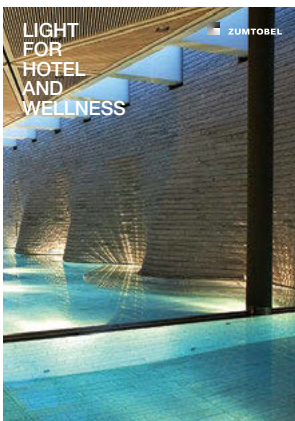
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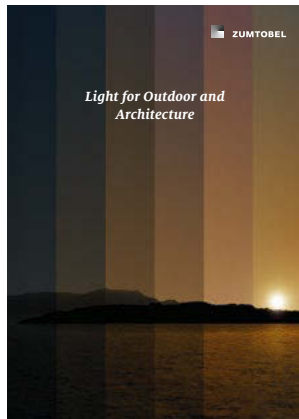
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- *Education and Science*
- *Presentation and Retail*
- *Hotel and Wellness*
- *Art and Culture*
- *Health and Care*
- *Industry and Engineering*
- *Outdoor and Architecture*
- *Living*

We provide unique customer benefits by integrating technology, design, emotion and energy efficiency. We combine the best possible ergonomic lighting quality for an individual's wellbeing with the responsible use of energy resources. The company's own sales organisations in twenty countries, as well as commercial agencies in fifty other countries, form an international network of experts and design partners providing professional lighting consulting, design assistance and comprehensive services.

**Lighting and sustainability**

In line with our corporate philosophy "We want to use light to create worlds of experience, make work easier and improve communications and safety while remaining fully aware of our responsibility to the environment", Zumtobel offers energy-efficient high-quality products, while at the same time making sure that our production processes based on the considerate use of resources are environmentally compatible.

[zumtobel.com/sustainability](http://zumtobel.com/sustainability)



**Top quality – with a five-year guarantee.**  
As a globally leading luminaire manufacturer, Zumtobel provides a five year manufacturer's guarantee on all Zumtobel branded products in accordance with the terms of guarantee at [zumtobel.com/guarantee](http://zumtobel.com/guarantee).

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Tracks and spots



Modular lighting systems



Downlights



Recessed luminaires



Surface-mounted and pendant luminaires



Free-standing and wall-mounted luminaires



Continuous-row systems and individual batten luminaires



High-bay luminaires



Luminaires with extra protection



Facade, media and outdoor luminaires



Lighting management systems



Emergency lighting



Lighting Services



Medical supply systems

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