



## Replacement of T8 luminaires with an ergonomic LED solution

Dr.-Ing. Hans Laschefski



Nur für interne Zwecke!

Die Informationen dieser Präsentation sind ausschließlich für Sie bzw. für Ihre Unternehmung gedacht. Eine Weitergabe an Dritte ohne unsere schriftliche Zustimmung ist nicht zulässig.

For internal use only!

The information included in this presentation is exclusively only for you respectively for your business action and may not be transmitted to any third party without our prior written approval!

ALANOD, 2013

# Agenda

1. Company presentation
2. Ergonomic demands of office/school lighting
3. Replacement of T8 luminaires with an ergonomic LED solution

# ALANOD – the world's leading company for surface treatment



Highest Reflectivity

Durability

High Value Appearance

Reduces Production Costs

Fire Resistant



- **Lighting, LED**
- **Daylighting**
- **Renewable Energy**
- **Composite Panel HPL/CPL**
- **Domestic Appliance**
- **Automotive**
- **Furniture**

Shared Product Development

Scratch Resistant

Colour Neutral Reflectivity

Best Adhesion

Best Absorption



# ALANOD – World's leader in surface treatment



... for the lighting - and solar industry



# ALANOD – World's leader in surface treatment



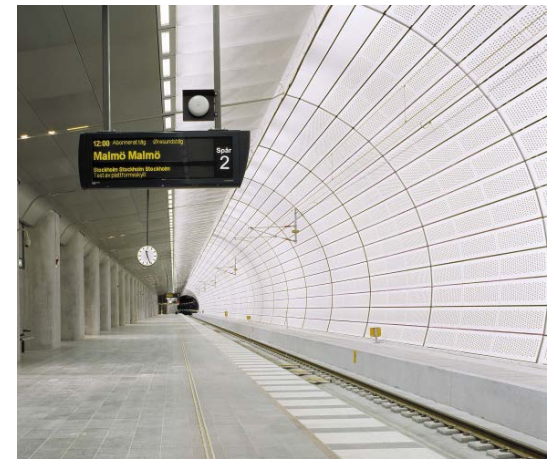
... for lighting - and decorative-technical applications



# ALANOD – World's leader in surface treatment



... for lighting - and wall/ceiling cladding

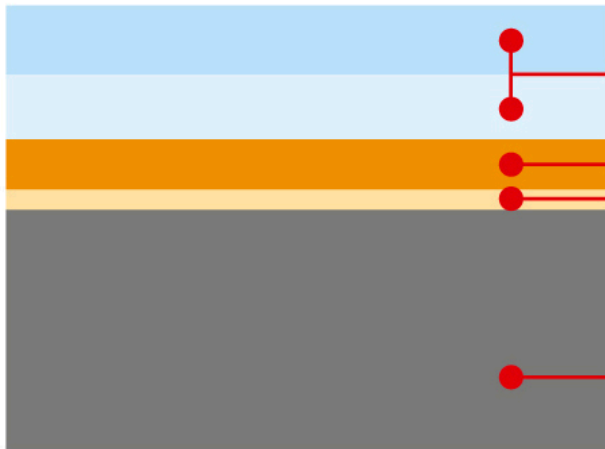






PVD - coating  
for  
enhanced reflections

A perfect combination!



*Super reflective  
oxide-layer system*

*Purest silver*

*Bonding-layer*

*ALANOD base material*

*Reflectance 98%*

“What are the demands in office/school lighting?”

Do we need something else but LEDs?



## The demands



Since 2012 LED light:

- Is really efficient – comparable to a T5 lamp
- comes along with a perfect colour rendering factor
- has extreme high luminance values (up to 300 times more than the established T5 solutions)



veiling luminance by glare

discomfort glare in an office or school situation  
caused by **uncontrolled luminance**  
of an efficient light source with perfect  $R_a$

# The demands



veiling luminance by glare



no veiling luminance by glare control

This is the aim of the game!

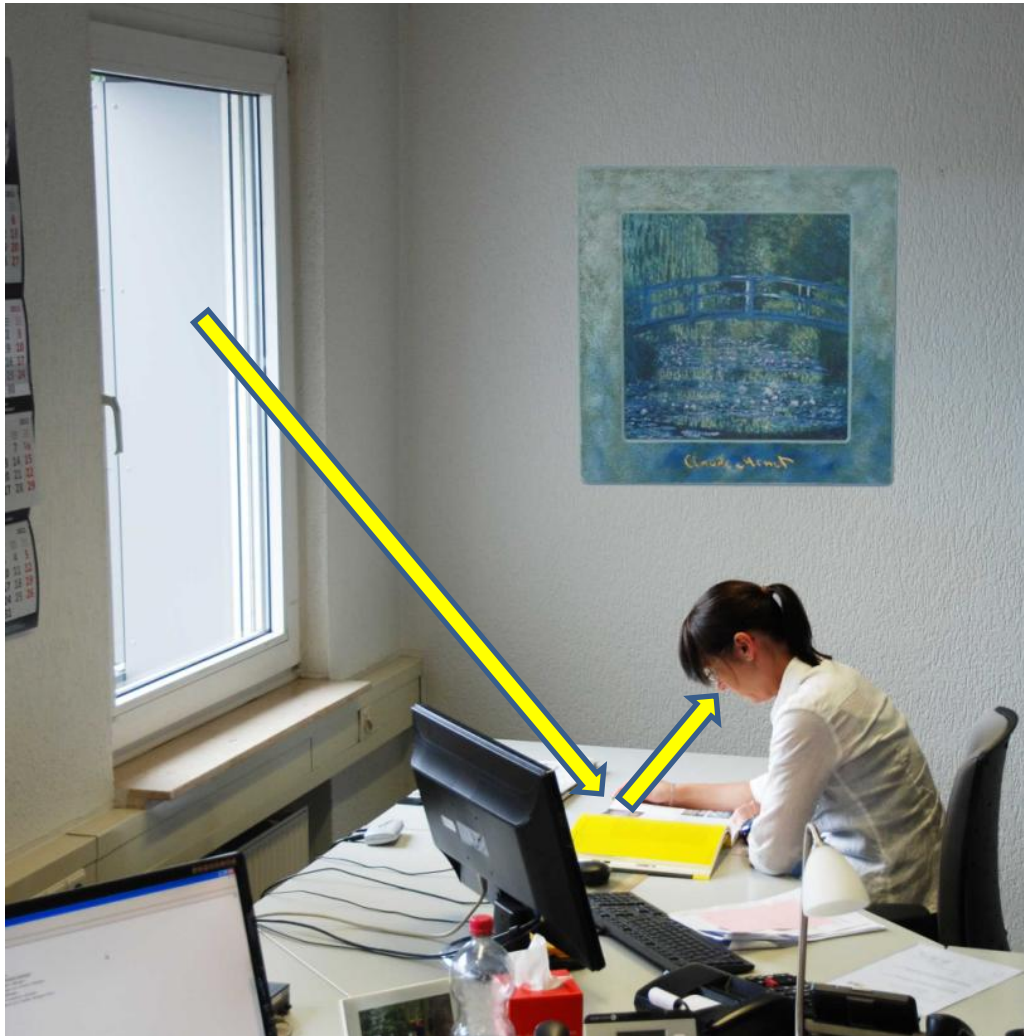
The quality product „LED-light“ need not to be only cheap and efficient but

- has to be comparable or even better than the established solutions (T5)
  - the price-performance ratio has to be acceptable
  - and it has to meet the **“Demands for good Perception”**  
(amazingly the demands are formulated by the use of **daylight**)

For that you need:

**Controlled Light Distribution**

we know .....

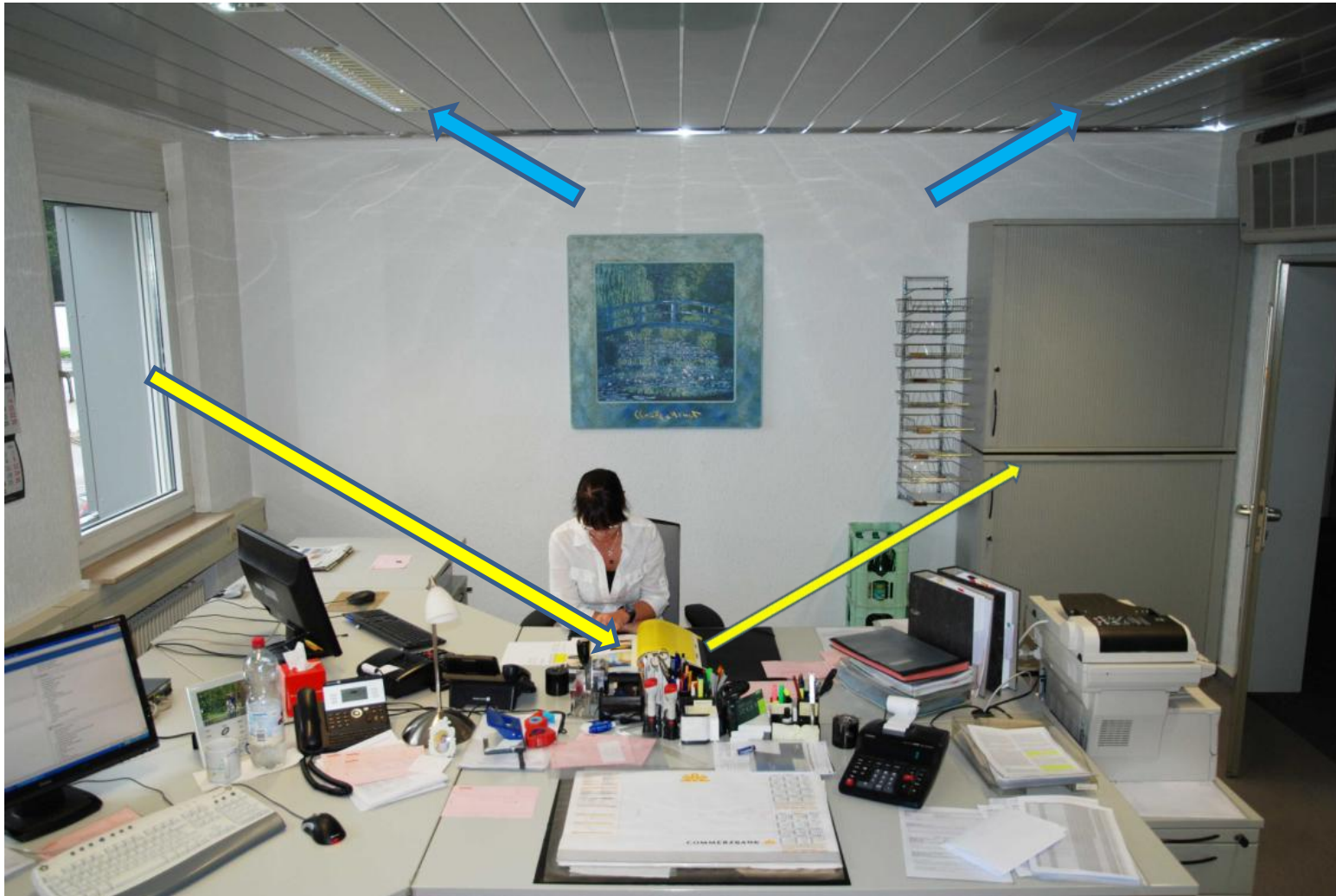


Perception made difficult by:

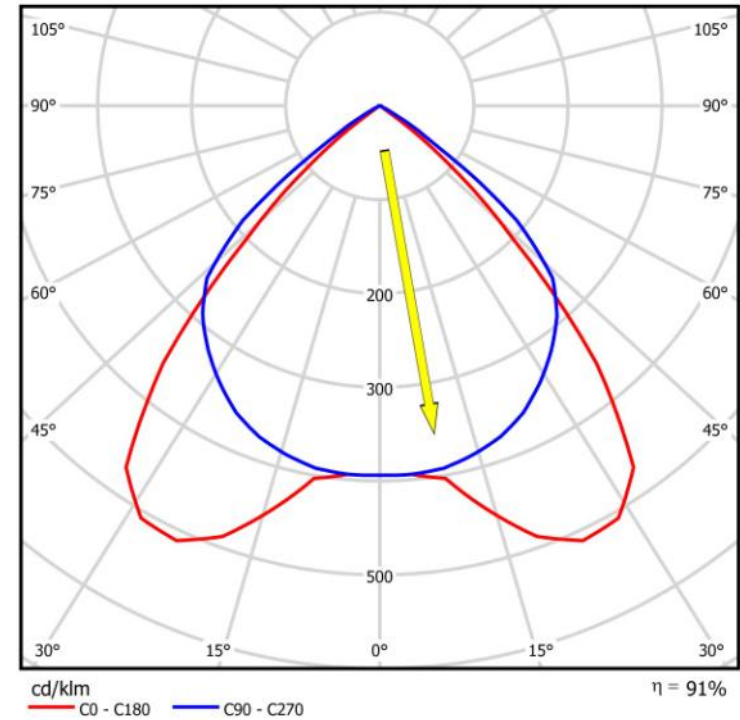
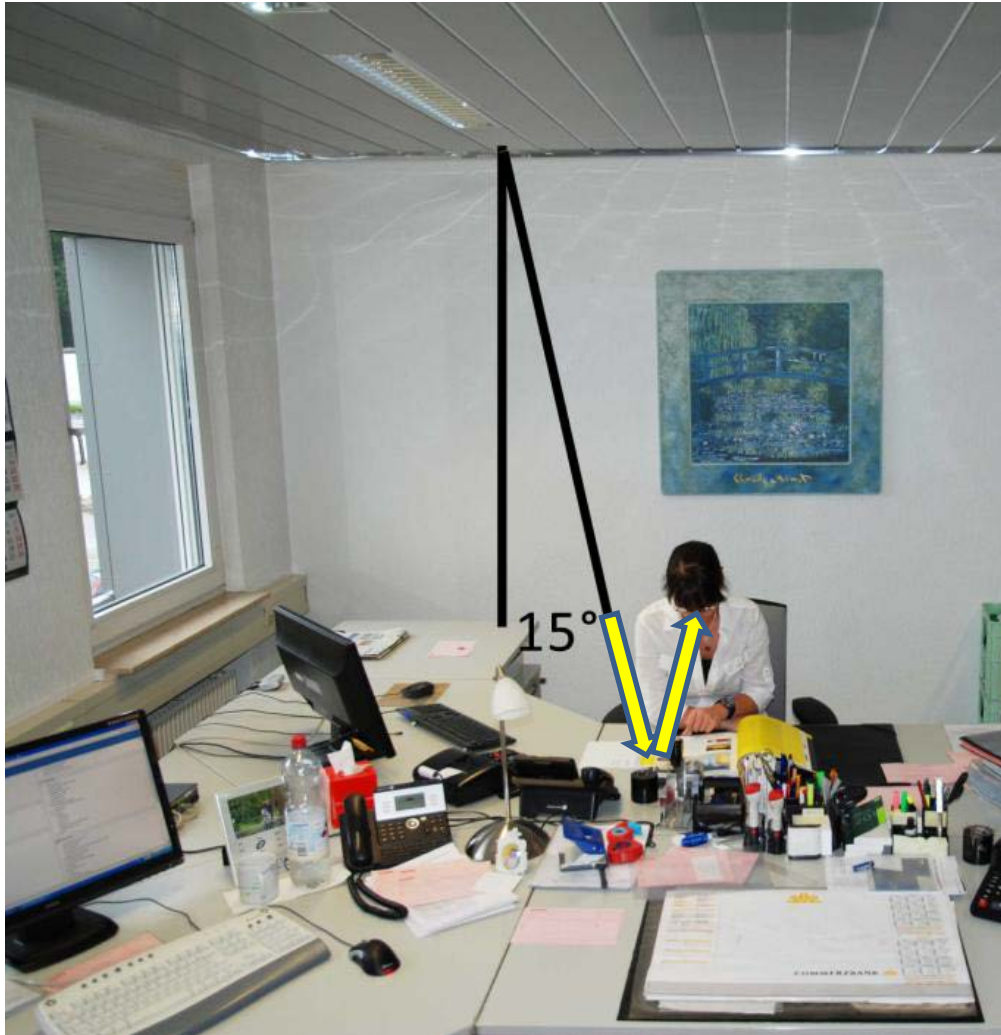
- reflected glare
- the wrong working position of the user



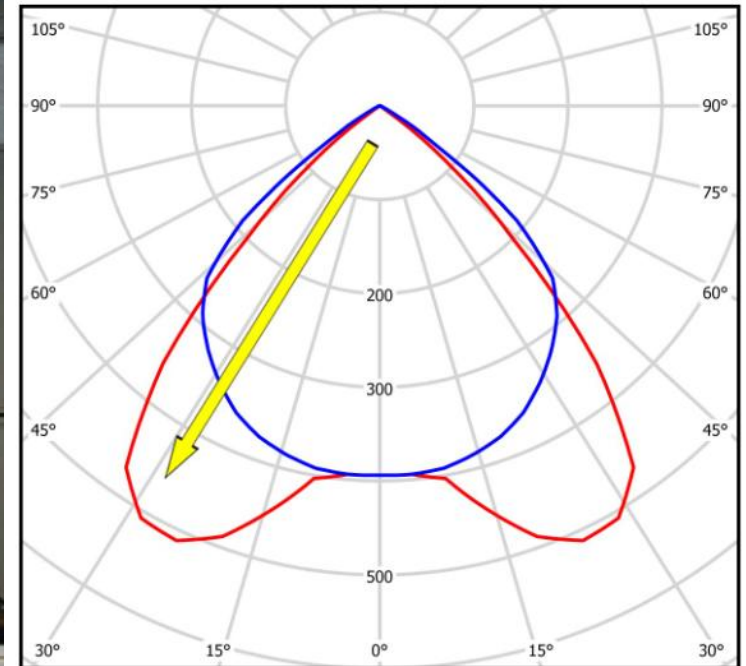
... the light direction matters  
(direction of artificial light and daylight should be the same)



... create a reduced luminous intensity in the core of your distribution



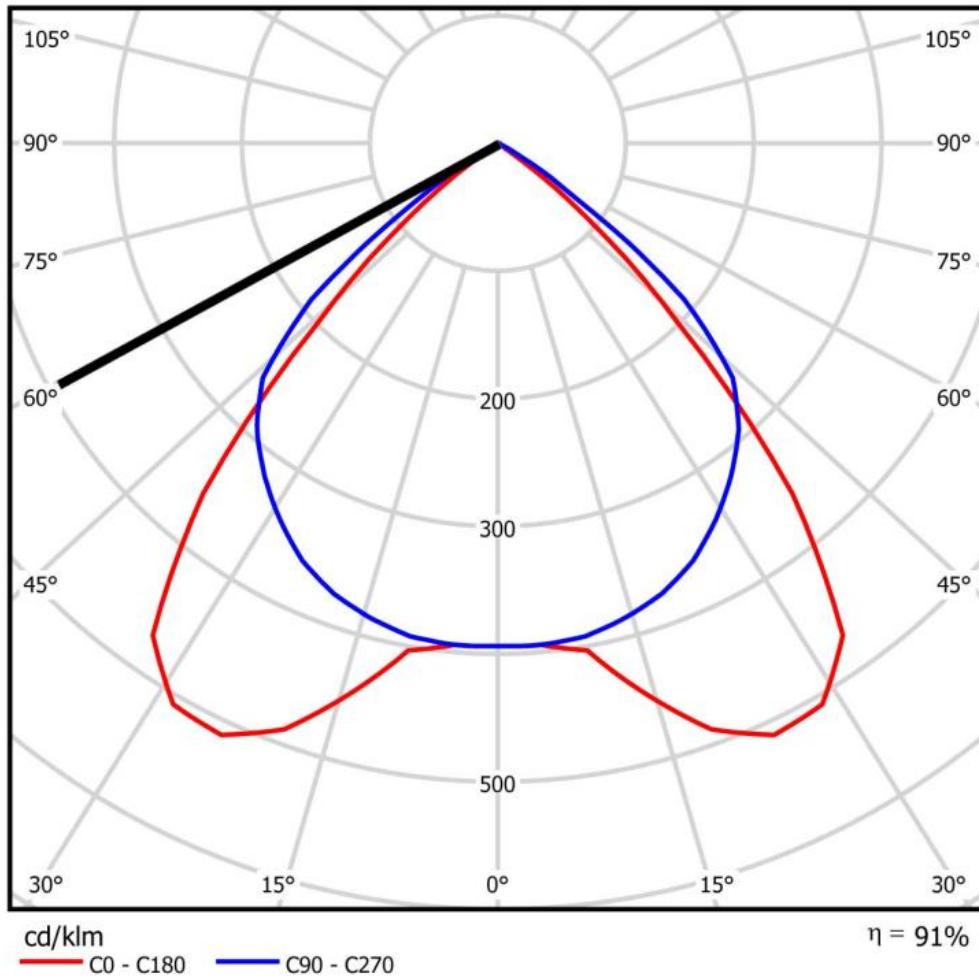
... and for more uniformity and larger distances between the luminaires



cd/klm  
— C0 - C180 — C90 - C270

$\eta = 91\%$

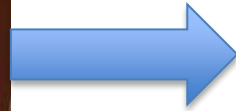
... and a sufficient shielding angle (60°)



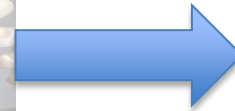
..... back to the sixties ?



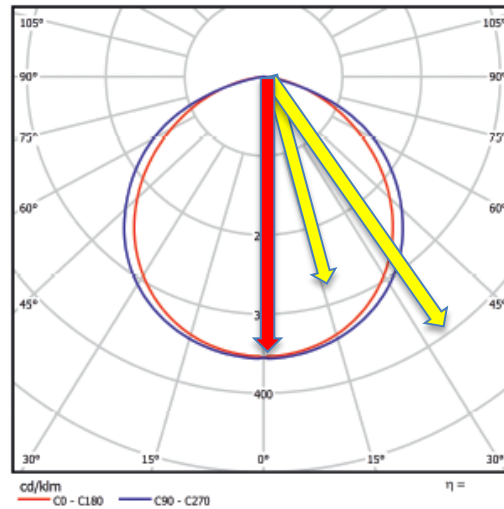
from small points of high luminance



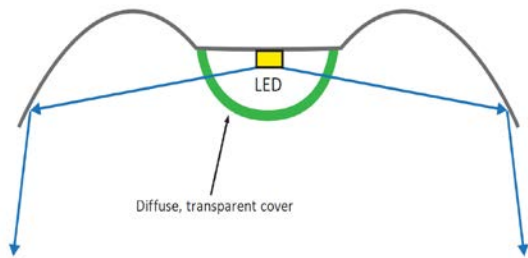
over a group of larger light points



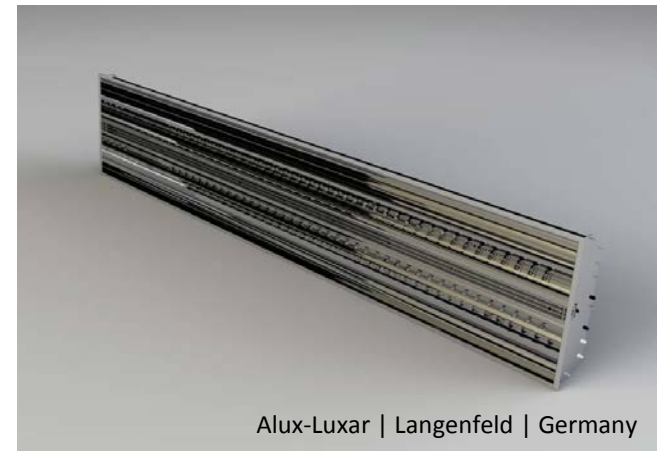
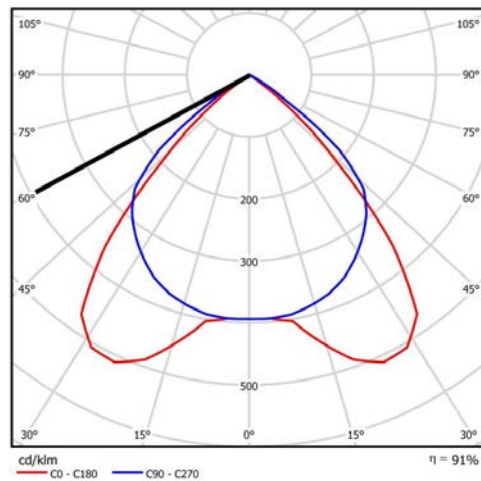
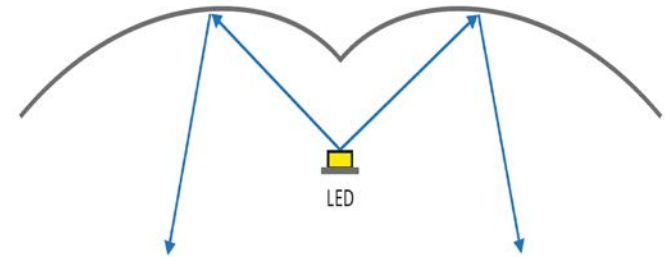
to a uniform but diffus beaming



..... reflector concepts that meet the demands



with  
MIRO<sup>®</sup> or  
MIRO-SILVER<sup>®</sup>



Replacement of T8 luminaires with an  
ergonomic LED solution

-

e.g. classroom lighting

## Old installation

Prismatic diffuser luminaires 2x58W KVG

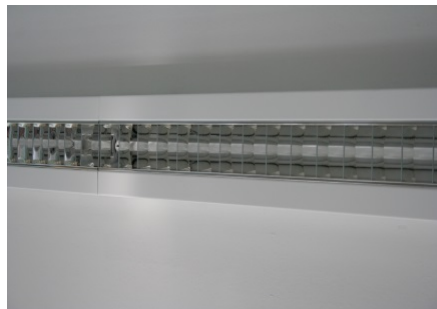
Power consumption of each fixture: 142W





## Step 1 - T5-solution (fluorescent-technology)

Luminaire TRILUX 5041 T5, 1x49W, with light-management-system Lightgate Reflector MIRO-SILVER® from ALANOD | Power consumption of each fixture: 54W



energy aspects	replaced luminaires 2x58W T8 conventional ballast	Step 1 1x49W T5 electronic ballast	
system power consumption of each luminaire [W]	142	54	
number of luminaires per room	8	8	
operating hours p.a.	1.600	1.600	
operating hours with light- management-system (LMS) p.a.		1.120	
power consumption p.a. [kWh]	1.818	484	
saved energy p.a. [kWh]		1.334	
saving p.a. [%]		<b>73%</b>	

# Reichenbach Gymnasium Ennepetal/ Germany

## Light refurbishment of the classrooms



### Step 2 – LED -

Luminaire TRILUX 5041RPX-L 3300-840 ETDD with light-management-system

Occu Switch (Daylight sensor, presence registration)

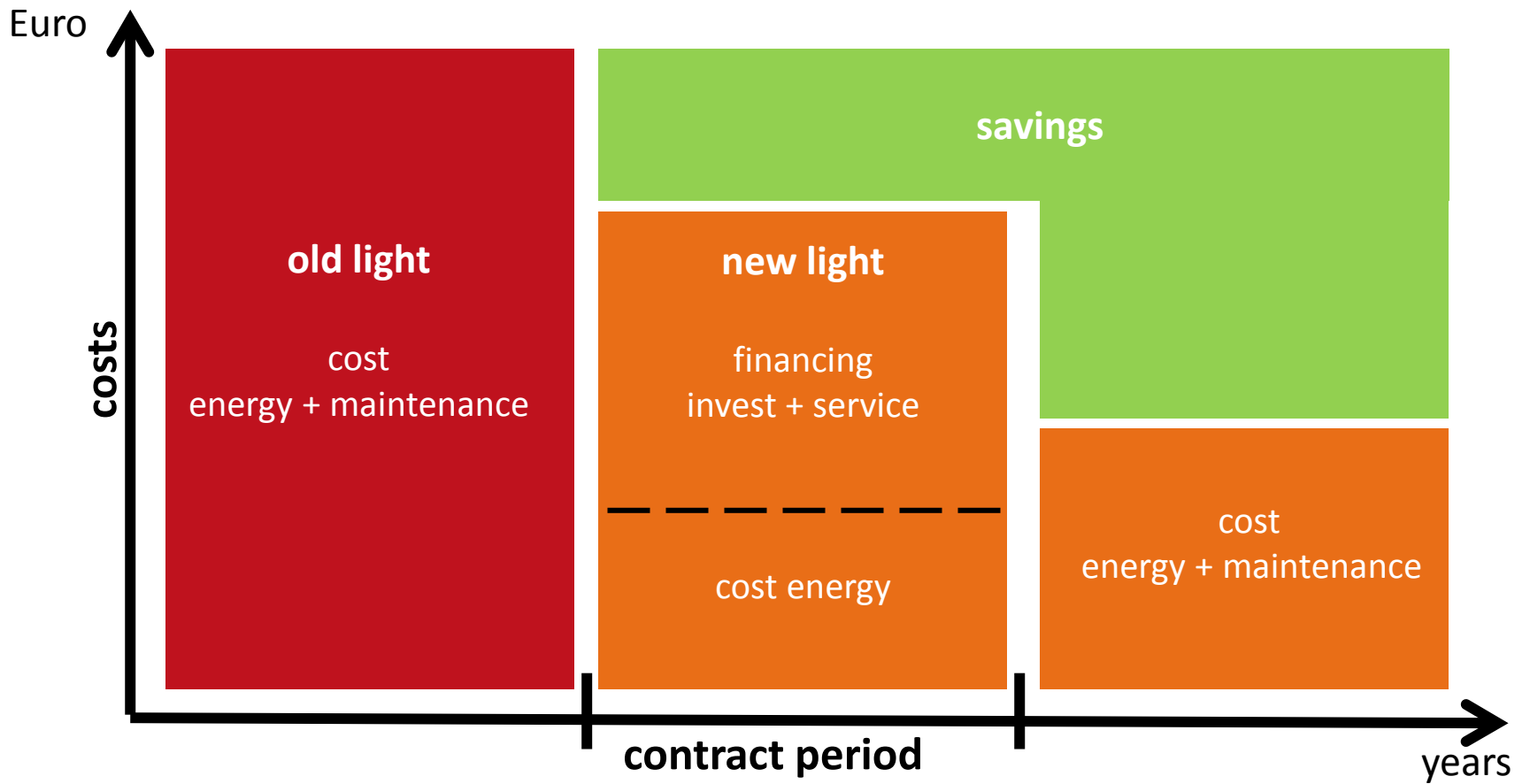
Reflector MIRO-SILVER® from ALANOD | Power consumption of each fixture: 42W



energy aspects	replaced luminaires 2x58W T8 conventional ballast	Step 1 1x49W T5 electronic ballast	Step 2 42 W LED electronic ballast
system power consumption of each luminaire [W]	142	54	42
number of luminaires per room	8	8	8
operating hours p.a.	1.600	1.600	1.600
operating hours with light- management-system (LMS) p.a.		1.120	1.120
power consumption p.a. [kWh]	1.818	484	376
saved energy p.a. [kWh]		1.334	1.441
saving p.a. [%]		<b>73%</b>	<b>79%</b>

commercial aspects	replaced luminaires 2x58W T8 conventional ballast	Step 1 1x49W T5 electronic ballast	Step 2 42 W LED	Step 2 42 W LED 30% BMU funding
service & invest	318 €	2269 €	3176 €	2223 €
price of electricity	0,21 €			
price increase	0 %			
observation period	20 years			
total costs over 20 years	7952 € (100%)	4301 €	4756 €	3804 €
<b>savings after 20 years</b>		<b>3651 € (-45%)</b>	<b>3196 € (-40%)</b>	<b>4148 € (-52%)</b>
<b>ROI</b>		<b>&lt; 4 years</b>	<b>5 years</b>	<b>&lt; 4 years</b>

commercial aspects	replaced luminaires 2x58W T8 conventional ballast	Step 1 1x49W T5 electronic ballast	Step 2 42 W LED	Step 2 42 W LED 30% BMU funding
service & invest	318 €	2269 €	3176 €	2223 €
price of electricity	0,21 €			
price increase	6,5 %			
observation period	20 years			
total costs over 20 years	15138 € (100%)	6214 €	6244 €	5291 €
<b>savings after 20 years</b>		<b>8924 € (58%)</b>	<b>8894 € (59%)</b>	<b>9847 € (65%)</b>
<b>ROI</b>		<b>&lt; 3 years</b>	<b>&lt; 4 years</b>	<b>&lt; 3 years</b>



## Conclusion

- An old, not energy-efficient T8 lighting installation causes continuously high avoidable costs.
- T5 or LED solutions **with the required (batwing) light distribution** provide a high benefit – not only in cost savings but also under ergonomic aspects
- Ergonomic aspects must always been taken into account, because only an efficient light production (by T5 or LED) without efficient distribution is not enough!



Many thanks  
for your attention!



ALANOD GmbH & Co. KG  
Egerstr. 12 | 58256 Ennepetal  
Germany

Phone: +49 2333 986-500  
Fax: +49 2333 986-555  
info@alanod.de

[www.alanod.com](http://www.alanod.com)

