Replacement of T8 luminaires with an ergonomic LED solution

Dr.-Ing. Hans Laschefski
Nur für interne Zwecke!

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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

ANODISING
PVD-COATING
HIGH TECH LACQUERING
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
ALANOD – World’s leader in surface treatment
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?
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)
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**
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

30° up to 35°
... 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® or MIRO-SILVER®

Trilux | Arnsberg | Germany

Alux-Luxar | Langenfeld | Germany
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

<table>
<thead>
<tr>
<th>Energy Aspects</th>
<th>Replaced Luminaires</th>
<th>Step 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2x58W T8</td>
<td>1x49W T5</td>
</tr>
<tr>
<td></td>
<td>conventional ballast</td>
<td>electronic ballast</td>
</tr>
<tr>
<td>System Power Consumption of Each Luminaire [W]</td>
<td>142</td>
<td>54</td>
</tr>
<tr>
<td>Number of Luminaires Per Room</td>
<td>8</td>
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<td>Operating Hours P.A.</td>
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<td>Saving P.A. [%]</td>
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<td>73%</td>
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</table>
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

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<tr>
<th>Energy Aspects</th>
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## Wirtschaftlichkeitsbetrachtung Lichtsanierung mit Finanzierung

### Commercial Aspects

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<td>1x49W T5 electronic ballast</td>
<td>42 W LED 30% BMU funding</td>
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### Comparison Table

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<tr>
<td>Service &amp; Invest</td>
<td>318 €</td>
<td>2269 €</td>
</tr>
<tr>
<td>Price of Electricity</td>
<td>0,21 €</td>
<td></td>
</tr>
<tr>
<td>Price Increase</td>
<td>0 %</td>
<td></td>
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<tr>
<td>Observation Period</td>
<td>20 years</td>
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</tr>
<tr>
<td>Total Costs Over 20 Years</td>
<td>7952 € (100%)</td>
<td>4301 €</td>
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<tr>
<td>Savings After 20 Years</td>
<td>3651 € (-45%)</td>
<td>3196 € (-40%)</td>
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<tr>
<td>ROI</td>
<td>&lt; 4 years</td>
<td>5 years</td>
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<tr>
<td>total costs over 20 years</td>
<td>15138 € (100%)</td>
<td>6214 €</td>
<td>6244 €</td>
<td>5291 €</td>
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<td>savings after 20 years</td>
<td>8924 € (58%)</td>
<td>8894 € (59%)</td>
<td>9847 € (65%)</td>
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<tr>
<td>ROI</td>
<td>&lt; 3 years</td>
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### Energy Costs Comparison

**Old Light**
- Cost: Energy + Maintenance

**New Light**
- Financing: Invest + Service
- Cost: Energy

**Savings**
- Cost: Energy + Maintenance
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!