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CIBSE Home Counties North East Region
Tuesday, 15 July 2014

DIALux evo lighting design software
- BS EN 12464-1
- Energy optimization and LENI
- DIALux and BIM
- Designing with LED's

Speaker:
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Teamleader Sales, DIAL GmbH

BS 12464

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- The BS12464 ask for further data than just average illuminance level or glare
- There is a number of changes and new measures in the 2011 release
- Those most important for lighting calculation / design:
  - 4.2 Luminance Distribution Measures
  - 4.2 Illuminance grid (1)
  - 4.3 Illuminance values
  - 4.4 Illuminance grid (2)
  - 4.6 Lighting in the interior space
  - 4.9 Lighting of workstations with DSE
  - 4.11 Energy Efficiency Requirements
  - 4.13 Variability of light

4.2 Luminance Distribution Measures

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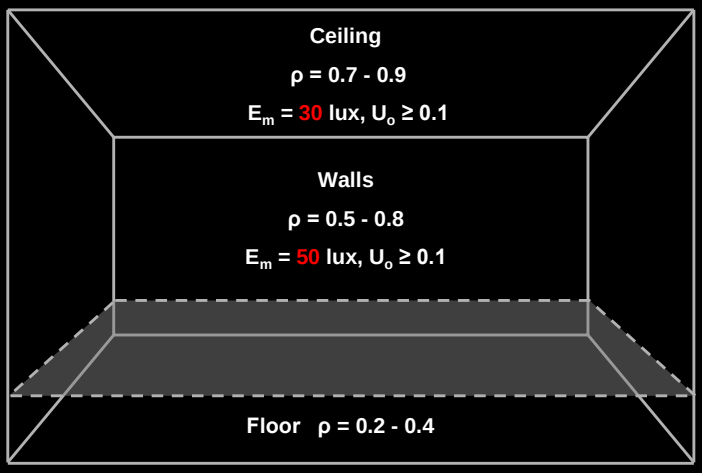
- The luminance distribution in the visual field controls the adaptation level of the eyes which affects task visibility.



Optician

4.2 Illuminance grid (1)

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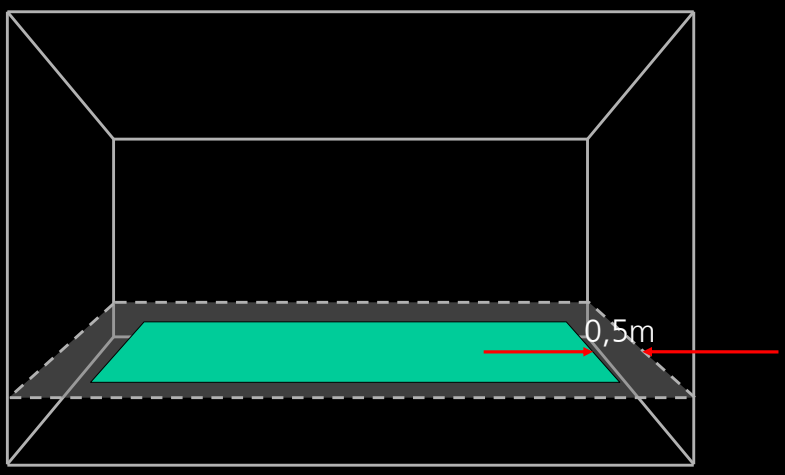
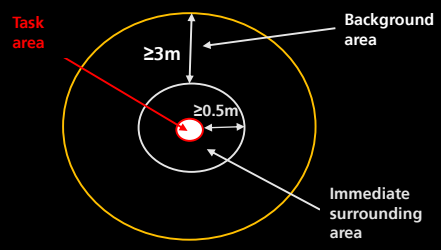
- A border of 0,5 m from the walls is excluded from the calculation area except when a task area is in or extends into this border area.



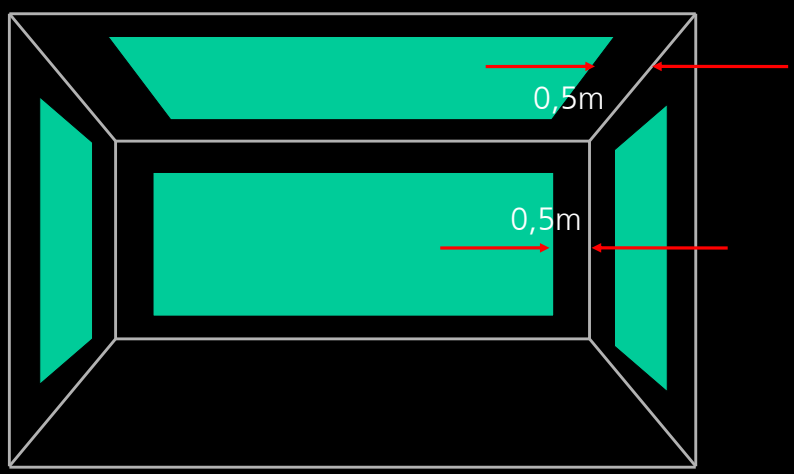
4.3 Illuminance



Task [lx]	Immediate Surround [lx]	Background [lx] 1/3 E_{task}
>750	500	167
500	300	100
300	200	67
200	150	50
150	E_{task}	50
100	E_{task}	33
<50	E_{task}	1/3 E_{task}
	$U_0 > 0.4$	$U_0 > 0.1$

4.4 Illuminance grid

- An appropriate grid size shall be applied to walls and ceiling and a border of 0,5 m may be applied also.



A design example in a small assembly hall

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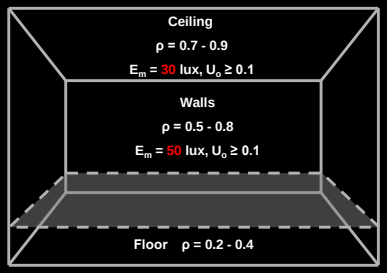
Table 5.18 — Industrial activities and crafts – Metal working and processing

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	UGR_L –	U_0 –	R_a –	Specific requirements
5.18.10	Tool making; cutting equipment manufacture	750	19	0,70	80	
5.18.11	Assembly:					
	- rough	200	25	0,60	80	
	- medium	300	25	0,60	80	
	- fine	500	22	0,60	80	
	- precision	750	19	0,70	80	
5.18.12	Galvanising	300	25	0,60	80	



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<50	E_{task}	1/3 E_{task}
	U_0 > 0.4	U_0 > 0.1

Standards Control Centre

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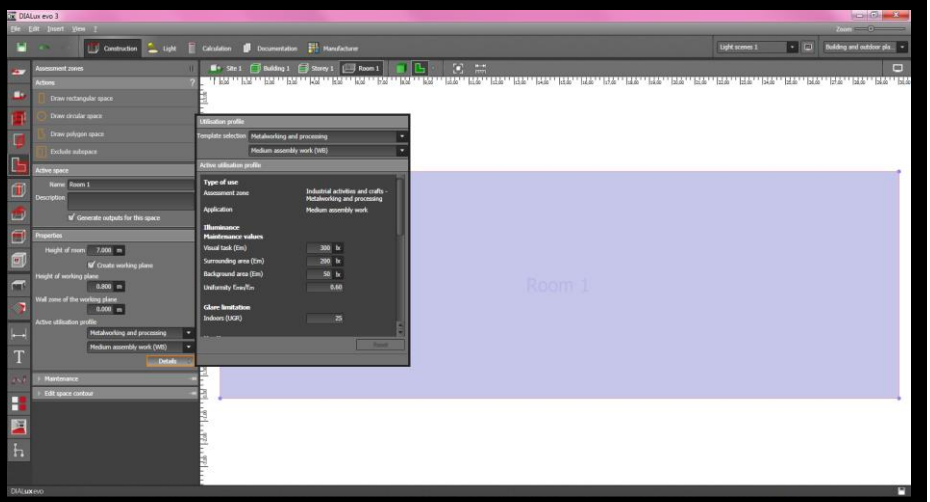

Main room surfaces

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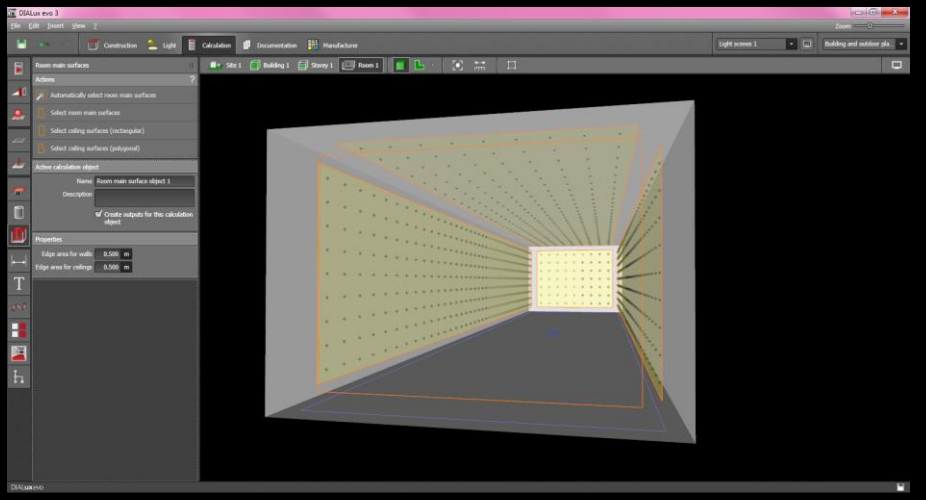

Task-, Surrounding-, Background Area

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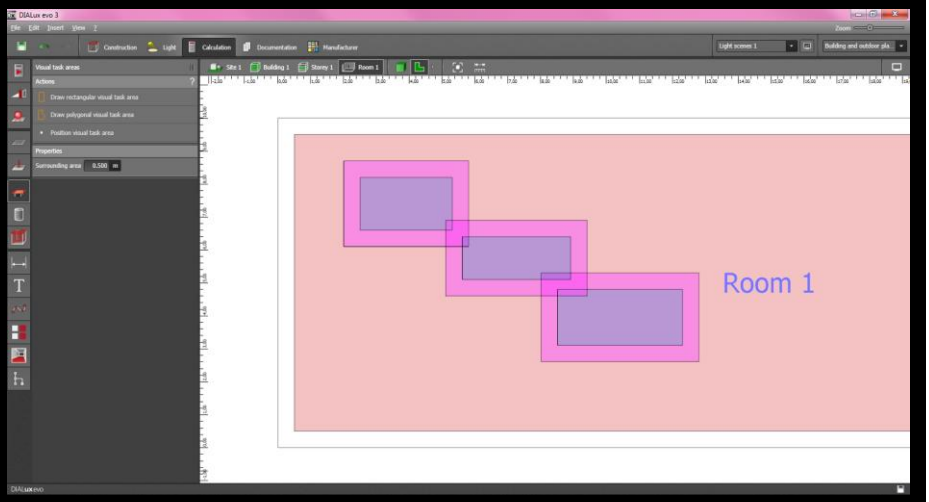

4.6 Lighting in the interior space

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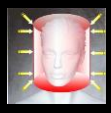
Mean cylindrical illuminance (E_c) requirements in the activity space
E_c = 50 lx Uo 0.10(in offices, meeting teaching areas 150 lx) at 1.2m for sitting & 1.6m for standing people above the floor



Modelling
E_c/E_h of 0.30 – 0.60 at 1.2m above floor is an indicator of good modelling

Directional lighting of visual task
Lighting from specific direction can reveal more details in the visual task, increase the task visibility and form, and create helpful shadows

Lighting in the interior space (Ec, Modelling)

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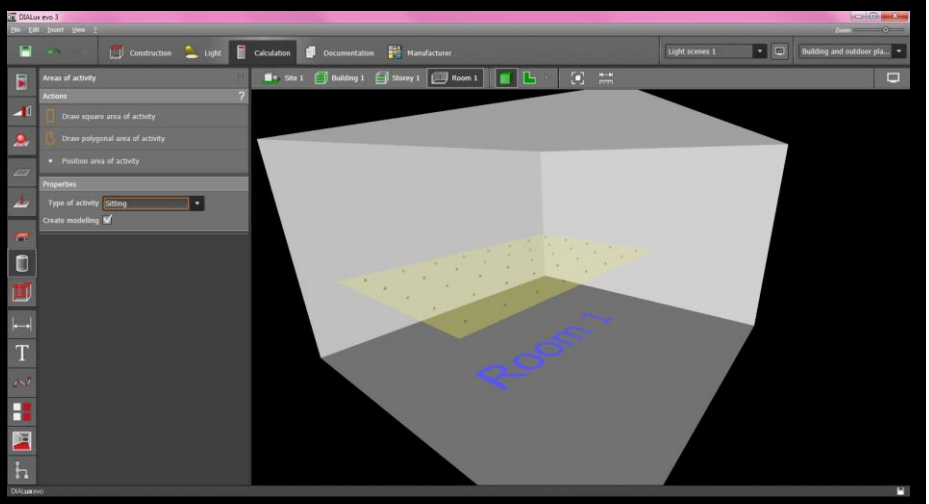

Lighting Energy Numeric Indicator, LENI

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- LENI is defined in the European Standard EN15193
- The standard is covering the „Energy Performance of Buildings“
- It specifies the calculation of the amount of energy used for indoor lighting
- Can be used for existing buildings and for the design of new or renovated buildings.

It's not that simple

The lighting design process

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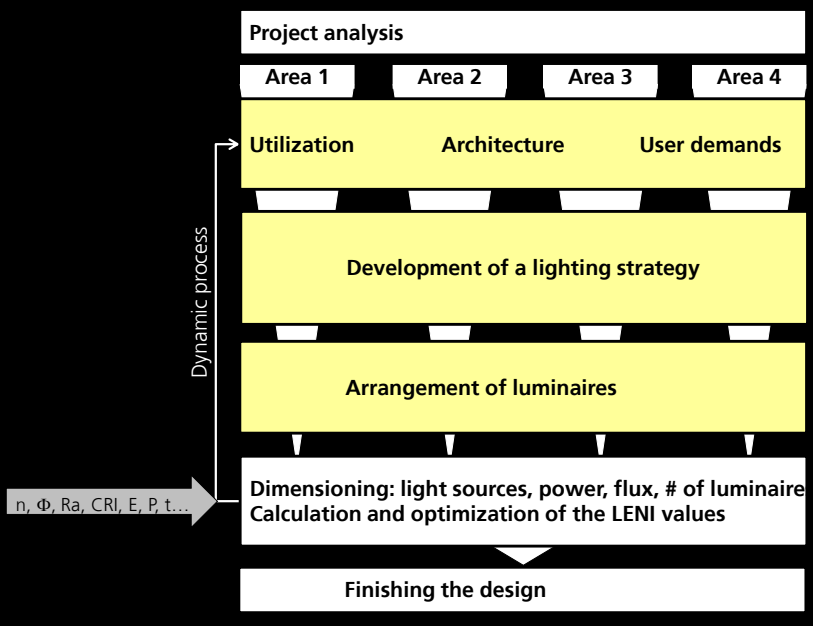

What LENI takes into account

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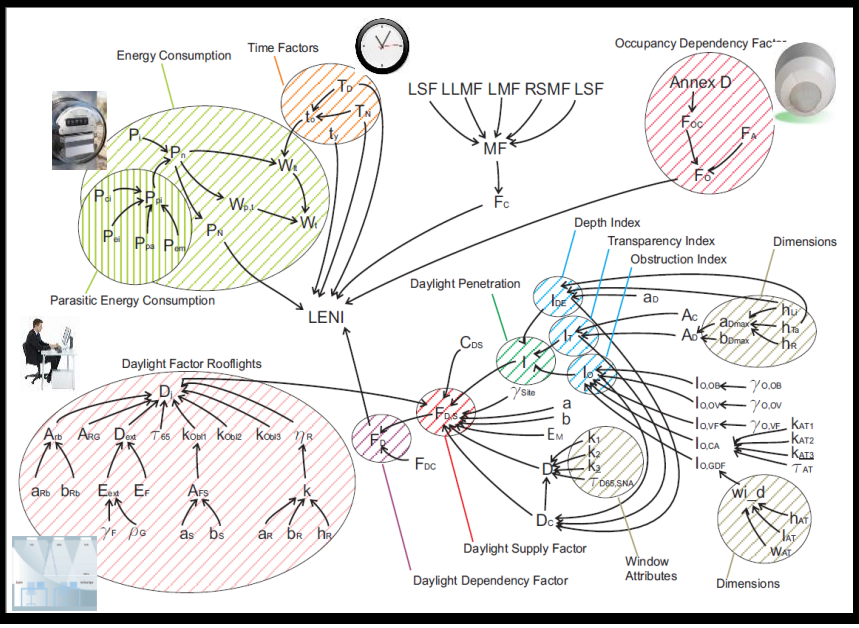

Energetic optimization

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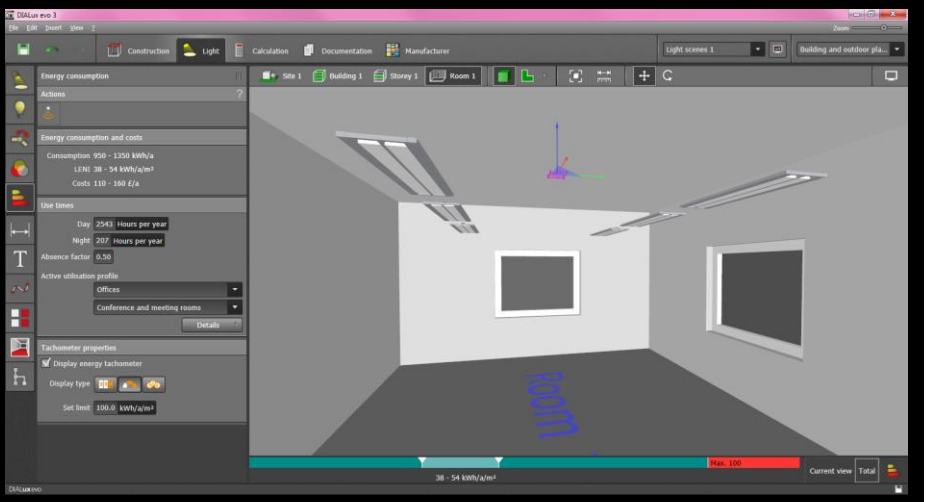

BIM Building Information Modelling

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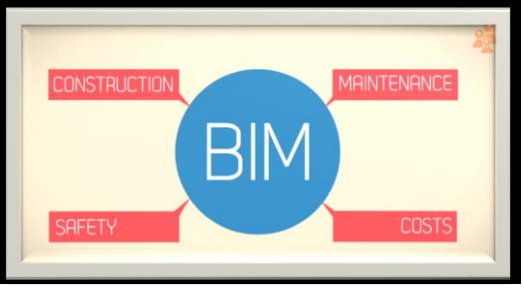
BIM:

Definition:
What do we mean by a door?
Function:
What are the properties of a door?
Performance:
What must the door be able to do?

CAD:

Only lines

- One set of data for all programs
- Work has to be done only once
- Changes happen everywhere for everybody
- A way of working together
- Open digital description



BIM for lighting designer

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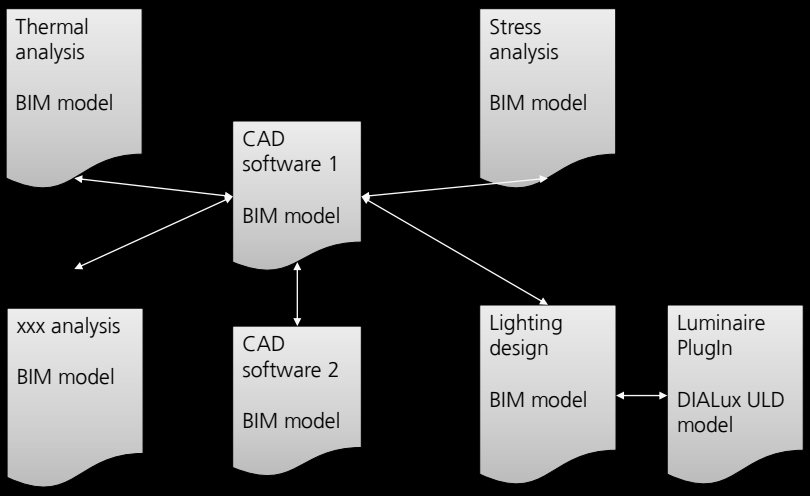
- Lighting design is one step in the building design process
- The lighting designer needs data from the building structure
- The lighting designer works out the lighting layout and passes this information to the architect / electrical engineer
- The lighting designer has to provide data about the products used
- Do we all have to use Revit now? - Is BIM only Revit?

The BIM process of lighting design



- Any program can be used. All programs share the same data.
- The BIM data is the IFC data model

Interoperability in DIALux

- DIALux offers a simple DWG/DXF interface, this is not BIM
- DIALux offers a proprietary interface called STF supported by more than 25 CAD software applications including Autodesk MEP and Nemetschek Vectorworks. This is a simplified logical model for lighting purpose only. "Mini-BIM"
- DIALux offers a gbXML interface. gbXML is for transferring building properties to analysis software. As BIM data mostly is to much information for the analysis tool, gbXML simplifies the transfer.

First example using DDS-CAD

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DDS-CAD and DIALux - the STF interface

Define the Building

1
Define the outer walls by outlining the building with the "Define Area" function.

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DDS-CAD and DIALux - the STF interface

Create the rooms

2
The Result.

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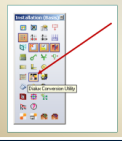
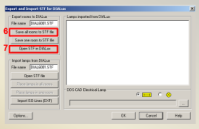
DDS-CAD and DIALux - the STF interface

Export the room information to STF

3
Export to STF and open in DIALux.





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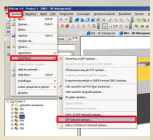
DDS-CAD and DIALux - the STF interface

4
Do the lighting design in DIALux

Export the STF file from DIALux and reopen it in DDS-CAD.



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DDS-CAD and DIALux - the STF interface

5
Continue with your electrotechnical planning in DDS-CAD (cable ladders, wiring, circuits, switchboards, etc).

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Second example using AX3000

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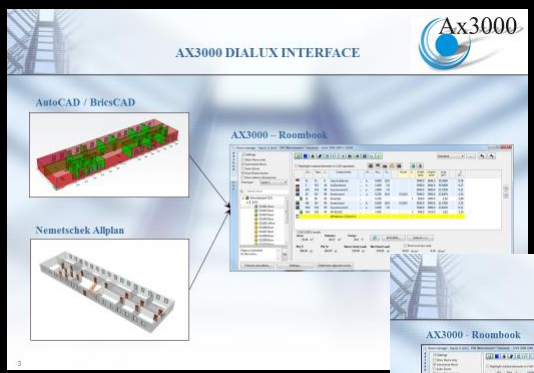
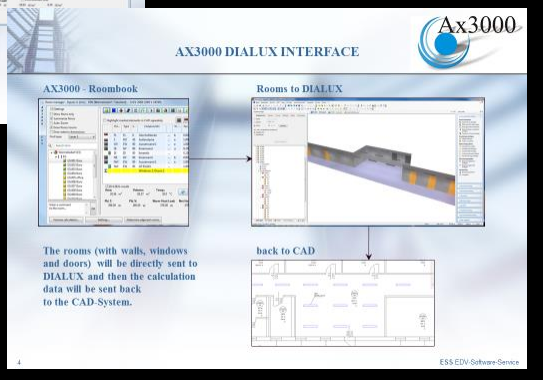
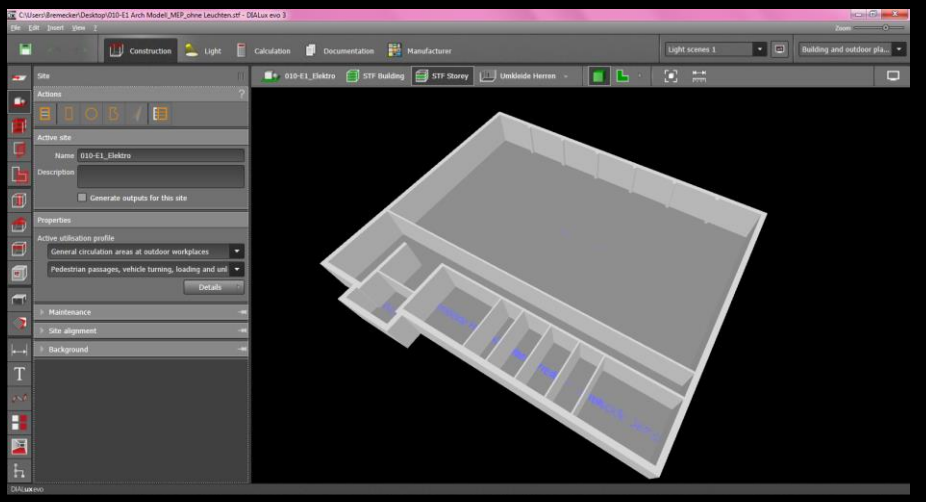




Using STF / gbXML in DIALux



- Example created by Autodesk AutoCAD MEP

DIALux and BIM

- Already now BIM data can be transferred using STF or gbXML
- STF is able to import and export data
- gbXML is able to be imported (to DX) and exported as DWG
- The lighting designer does not need a BIM CAD software (Revit, Vectorworks, Microstation…)
- The lighting industry provides DIALux PlugIns. The product data is used to be exported to the BIM file / software

Lighting design and LED's

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- LED luminaires are nothing special for a state of the art software
- LED's as lamps or luminaires are offering additional information / benefits for the design:
  - High efficiency
  - Long maintenance cycles
  - Wide variety of available light colours
  - Good colour rendering
  - Controllability
  - Small size
  - Modularity
- All this data has to be transferred to and to be used by a design software

Photometric data

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- Photometric data of luminaires is necessary to do a lighting calculation
- Is there a problem with SSL products and photometric data?

Relative vs. Absolute photometry

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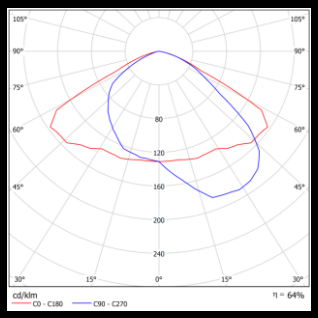
- We first test the lamp and than the luminaire
- Data for the luminaire independent from the lamp used during the testing
- Data normalized to 1000lumens
- Light output ratio (LOR)
- Data can be adapted to changes
- The designer can use a specific lamp flux



- The problem with LED luminaires:

  <u>There is no lamp!</u>

Absolute photometry

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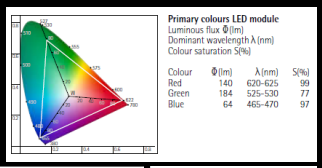
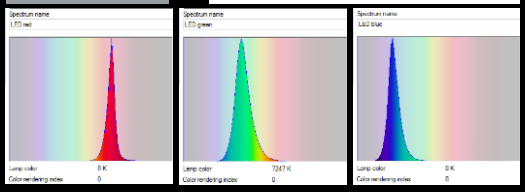
- The IESNA has published a document about "Electrical and Photometric Measurements of Solid State lighting products" the IES LM-79-08
- LM 79 says that the presentation of the normalized luminous intensity distribution cannot be used for SSL products
- Instead of the light output ratio we have to display the luminous efficacy as: $\eta_V = \Phi_{Test} / P_{Test}$ [lm/W]
- IES files are not 1:1 compatible to EULUMDAT / TM14
  - No luminaire geometry
  - Completely different coordinate system
- A lot of confusion with data from far east and from the US

Photometric data

- What is missing?



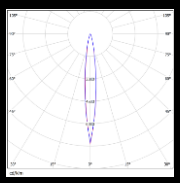


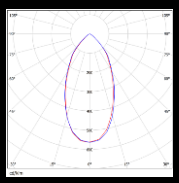
Source: ERCO, Philips

- Spectra, max. flux for each channel

Photometric data

- What is missing?





Source: Schreder, Philips

- Controllable beam angle,
  different luminous intensity distributions

Photometric data

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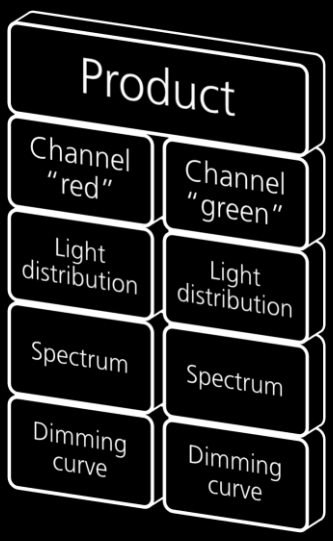
- Existing standard data formats are not able to transfer all the specific product information to the design software
- The lighting designer is not able to use all the product features in his design
- The end user cannot "see" the advantages of the LED products

Solution:
LED luminaires with complex photometric data should be presented in electronic catalogues that support the specific features of SSL lighting products



Electronic catalogues / PlugIns

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- Offering technical data is good for those who know what that means
- Showing an example is just better
- Inspire the user and show him what he could get

Source: Philips

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Find video tutorials at: http://www.youtube.com/user/TheDIALux

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Thank you very much for your attention!