

## LYS laboratorium, Velux Event Daylight Kinetic og AUTARKI Passiv House Con- struction

Byens Netværk 26.09.12  
Tekst og foto: Mikkel Egeberg  
Rasmussen

Som led i Byens Netværks indeklima-tema, som vi startede i 2011, har vi nu fået mulighed for at besøge LYS Laboratoriet under Arkitektskolen. Der arbejdes her med, at flytte grænserne for, hvordan man kan anvende dagslys. Med øvelser fra teaterverdenen, 1:1-modeller og studerende i workshops udvikler lektorerne Karina Mose og Karin Søndergaard fra Kunstakademiets Arkitektskole nye metoder til arbejdet med at bruge dagslys som en del af arkitekturen i fremtidens bygninger.

Efter vi er blevet budt velkommen, hører vi oplæg af Karin Søndergaard om Velux Event 2012. Formålet er at undersøge muligheder vedrørende udformning af dagslysåbninger, og hvordan man giver mulighed for at udfolde de rumlige kvaliteter. Det teoretiske perspektiv anvendes til at kontekstualisere dagslyseksperimenter og gør det muligt for de studerende at understøtte og kvalificere deres argumenter. De studerende introduceres til performative analysemetoder,



baseret på psykofysiske øvelser. De trænes i at blive ekstremt opmærksomme på rummets dagslysforhold, og for at fremme fordybelsen følger de en række bevægelsesmønstre. Det kan f.eks. være, at de skal arbejde med tre tempi – gå hurtigt, gå langsomt og stå stille - i deres undersøgelse af rummet. Metoden anvendes bl.a. som en del af en workshop, som Karin Søndergaard og Karina Mose står bag. De studerende lærer nye metoder til at arbejde med dagslys, og samtidig bruger forskerne resultaterne af workshoppen som empiri og cases i deres forskning i, hvordan man kan arbejde med dynamiske lysrum og udvikle brugen af dagslys i arkitekturen. Man prøver der ved, at flytte grænserne for, hvad man egentlig kan i brugen af det gratis dagslys. I øjeblikket er valgmulighederne for ovenlys stort set begrænset til et udvalg af plastickupler og almindelige ovenlysvinduer, hvorfor man ønsker at udvikle nogle metoder, som arkitekterne kan anvende til at koble det arkitektoniske rum med dagslysindtaget. Forskningen i dagslys handler om både at sikre større menneskelig trivsel og bæredygtighed i energiforbruget i fremtidens bygninger. Dagslysets dynamik og naturlige foranderlighed virker stimulerende på mennesker, og det gælder derfor om at bruge dagslyset bedst muligt i de indendørsrum, hvor mennesket i dag bruger det meste af sin tid.

### **AUTARKI 1:1**

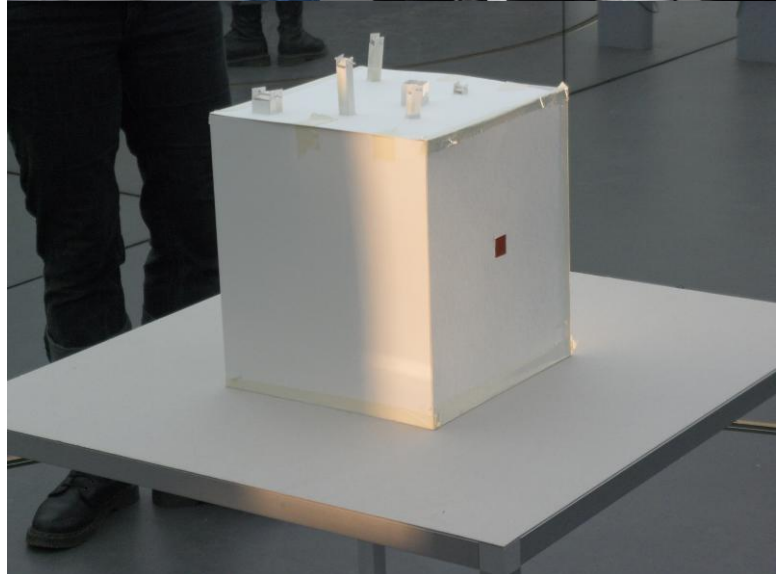
Efter et spændende oplæg, er der foredrag med Lektor og Design

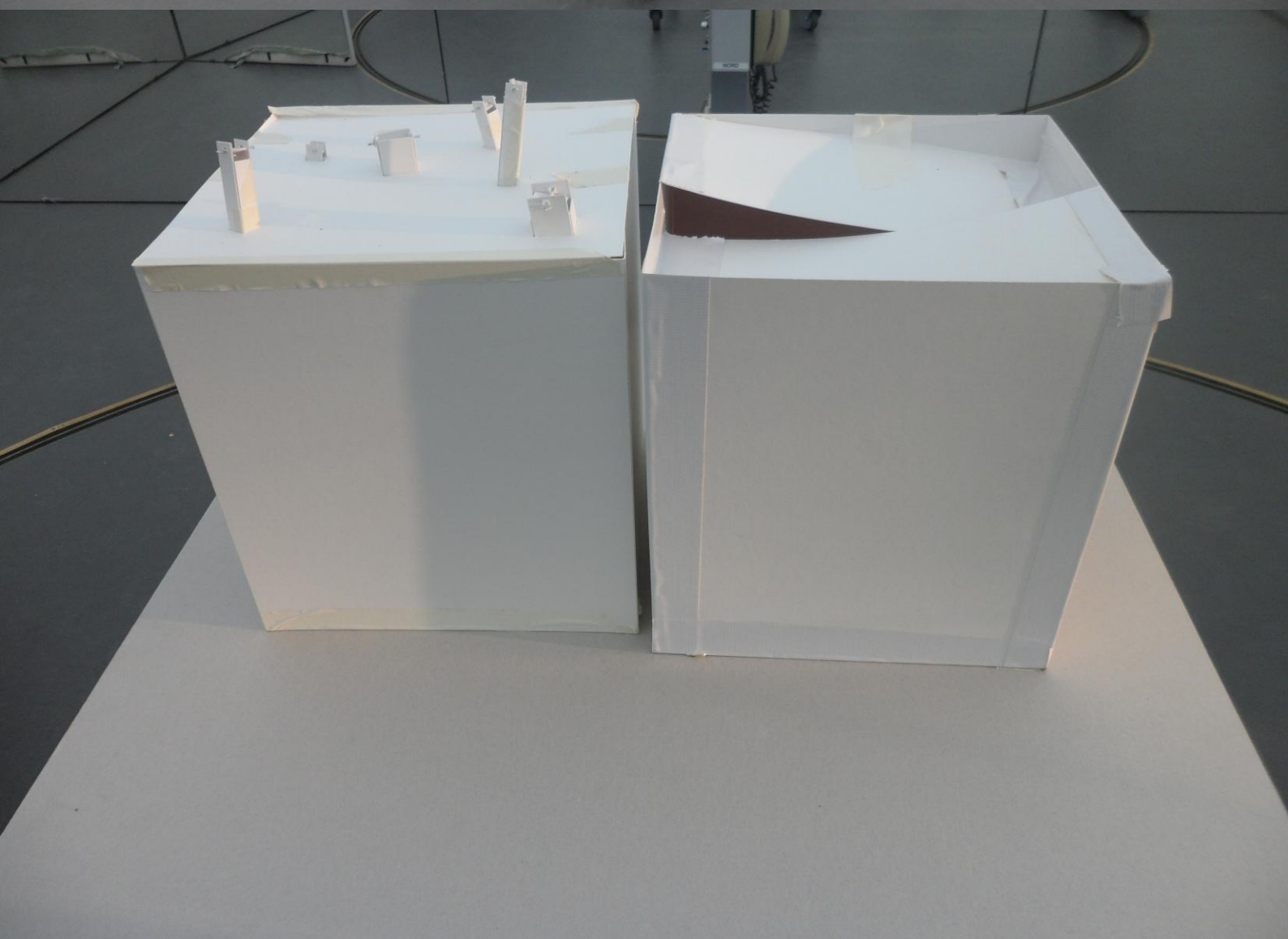


Director of Kvadrat Soft Cell Jesper Nielsen samt videnskabelig assistent Nikolaj Callisen Friis, der fortæller om AUTARKI 1:1.

Projektet fokuserer på videreudvikling af de aktuelt brugte designprincipper for krydslamineret træ. Gennem konstruktivitet og procesoptimering for udnyttelse af materialet studeres byggeprincipper for både at forbedre materialernes genanvendelighed og reducere bygningens samlede energibehov. Materialerne testes såvel teknisk, klimamæssigt og arkitektonisk i et eksperimentelt byggeri. At bygge med massivtræ er en relativ ny byggeteknik, som har potentielt gode anvendelsesmuligheder i lavenergibyggeri grundet en simpel byggeproces, meget høje isoleringsværdier og minimale skuldebroer. Det krydslaminerede træ udmærker sig bl.a. ved at være meget stabilt, samt at det kan laves i store stykker.

Efter foredraget, afslutter vi dagen med en rundvisning på sitet. Her ser vi Lys Laboratoriet, de studerendes full-scale modeller fra workshoppen samt forsøgspavillonen fra AUTARKI 1:1.







LYS KAN SKJULE



LYS KAN SKABE FORM



MAN KAN LYSKLEDE LYS OG SE DET BAGPÅKOMMENDE LYS



DETALJER OG MATERIALITET GIVER LYSET KARAKTER



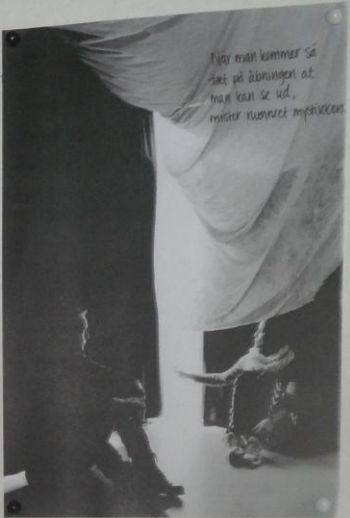
LYS ER OGSÅ NOGET MAN KAN RØPPE



Man kan ikke se lyset, men man kan se det som lyset skaber



Der er et helt andet rum med den samme belysning



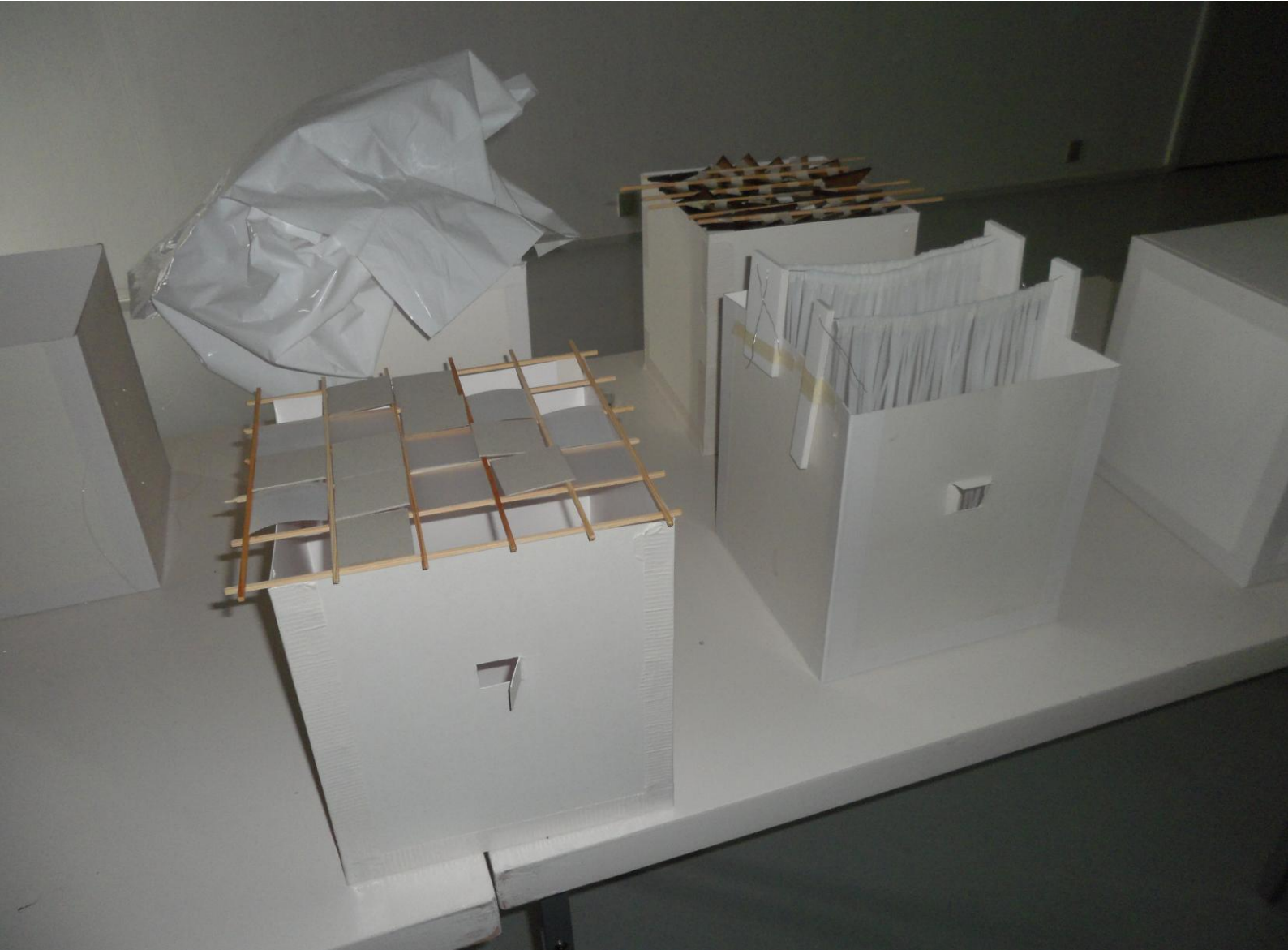
Der må komme så tæt på belysningen at man kan se ud, ellers rummet påvirkes



Rummet er et andet rum med den samme belysning



Man kan ikke se lyset, men man kan se det som lyset skaber

















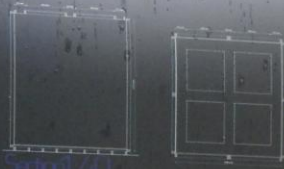
# Timed Apertures 556 Copenhagen Daylight Event 2012



Søren Eider Rasmussen  
 Architects: Copenhagen  
 Form: 10/10/10  
 Zeno's Paradox  
 The Golden Ratio  
 The Fibonacci Sequence  
 The Golden Spiral  
 The Golden Rectangle  
 The Golden Triangle  
 The Golden Sphere  
 The Golden Cube  
 The Golden Pyramid  
 The Golden Cone  
 The Golden Cylinder  
 The Golden Torus  
 The Golden Ring  
 The Golden Chain  
 The Golden Knot

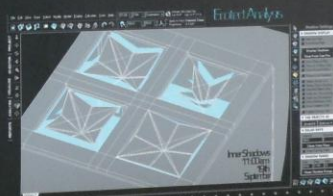
Rasmus: Vibe Denmark A/S  
 Institute of Architecture  
 Architects: Prof. Søren  
 Eider Rasmussen  
 Architects  
 Copenhagen  
 Denmark

## 3D Visualization



We created a structure with a set of 4 openings, all the same size. In each opening there is a flat plate structure that controls the amount of light let into the room. The structure can change form from a flat surface, shutting out the light, into a precise geometric shape that guides and reflects the light onto the ceiling, floor and walls. These shutters are manipulated by covering and uncovering a container connected by a string to the center of each shutter. Gravity will pull the container down and force it open. Creating a dynamic light scape, as the sand slowly leaves the container by a hole, and the shutters are closed. This setup spins the experience in two phases. First a slow phase experience adding the sand. And a passive behavior phase with time in a central element. The parallel displacement of these four similar movements creates a changing display of light zones and cast shadows, stressing the importance and influence of daylight in our perception of space.

## Concept

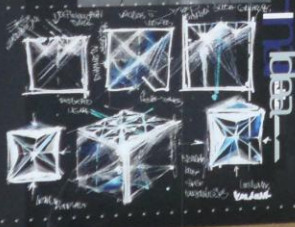
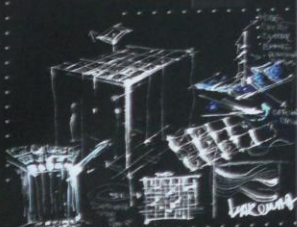


## Introduction

Light, space and time are closely related in physics, religion and everyday aspects of life. Our calendars and time are based on the relation of the sun and the earth. Progression of day, is time drawn in daylight. Light can puzzle our perception, emphasizing form or completely dissolving space in boundaries. Daylight is a conductor setting the pace for life, a tool and a frame for architecture.

"Architects cannot control daylight alone, it changes from morning to evening, from day to day- both in intensity and color". - Søren Eider Rasmussen

## First Sketches







**DAYLIGHT EVENT 2012**  
**The Kinetic Light**

**Institute 2 Architectural Lighting**  
 Associate Professors  
 Karina Mose, Karin Søndergaard

**Department 11**  
 Architecture, Design & Industrial Form

Natasja Jankowski, Elin Kjør  
 Mikl Marita, Yosse Imor, Yi Lun Wu,  
 Andreas Schuster, Johan Jeppesen,  
 Sofie Linnebjerg

**Partners**  
 Velux Danmark A/S

**Spatial and light concept diagram**

**The Assignment**

The Designer's brief: Project conceptualises daylight as a dynamic component in order to create a contemplation of architecture.

For this project, we were asked to design and build an installation, which comprises different zones of lightness and darkness that is characterised by the 2.5m x 2.5m cube which was supplied to us would house the instrument (daylight).

The given understood that the fundamental purpose for the project, and the ability to manipulate light in such a way could be strongly influenced by the material provided and how they are designed to work with each other. These materials included PE fabric, steel fibre, sticks and steel wires.

During the design phase, the team paid close attention to the facade light, which sets some specific conditions to work with daylight, which opens from bright exterior sun light to overcast skies.

**The Concept**

Our concept is challenging the classical perception of light in a room, and the different material and reflections of daylight.

Our execution of the concept aims to ultimately design a room with no conventional corners where the spectator can naturally grasp the construction. Through this design, as the spectator engages the space, they are compelled to engage and receive the light that is manipulated through the object. This allows the active movement of the physical body in space.

Our design of myself of small cylindrical components creates a curtain of a flexible structure, which depending on the exposure and the movement of the different elements to operate with translucency, filtering and reflecting light as it passes through.

The filter is incorporated in a grid that using with strings and fibre function. As we hope to create the users to interact with the filter, in order to create variations in dimension, and therefore vary light exposures.

The changing conditions outside the box are also accounting and directing the daylight that falls into the space. The surrounding environment and the sun position is affecting the incoming light and therefore the final experience.

**The Process**

Our initial part of the design process was based on material. We did a practical test evaluation of the panel material according to its qualities in work, shape, flexibility and exposure. We tried out different designs, ranging from very simple to more complex, and discovered that it could be expressed as interesting contrasts between the artificial material and an organic shape.

The experimental interest in exploring the different design potentials in the installation with light, the experimental and these material forms, which respectively consisted of string, cutting and repetitive elements.

The fabric created beautiful surfaces of light and shadow, but the materials qualities in order to be the most made it impossible to realise the design.

The concept would be a combination of light and shadow, but the structure was not flexible enough to create beautiful formations of light and shadow, but the structure was not flexible enough to create beautiful formations of light and shadow, but the structure was not flexible enough to create beautiful formations of light and shadow.

The repeated elements create a strong structure like a filter that is malleable in the cutting and the work is additive, the combination of the material and the structure offer the best way to operate with translucency, filtering and reflecting.

Therefore, we chose to work with this structure.

**In the final phase we investigated different implementations of the filter in the room, and the interaction with different light exposure. Different amounts of light and the way of the aperture to give significant differences in the mood.**

In order to make expressions of the space through light properties, we were able to give the spatial expression, which only the material reflecting light was allowed to enter using the edge of the ceiling.

**The Result**

In the final design we wanted to create an experience of the correlation between the artificial material and the organic structure, but increase the contrast between the ability to play with various expressions and yet practical use of the filter.

The final expressions of the installation offer people the possibility of interaction. By moving around the installation, you will see the correlation between light sources and how they are in a room.

Our design emphasises the various expressions of the light. The movement will enhance the work consequences of daylight.

**Section 1-15**

**Floorplan 1-15**

**Process Pictures**

**Construction and interface**