



DIGITAL PHYSICAL

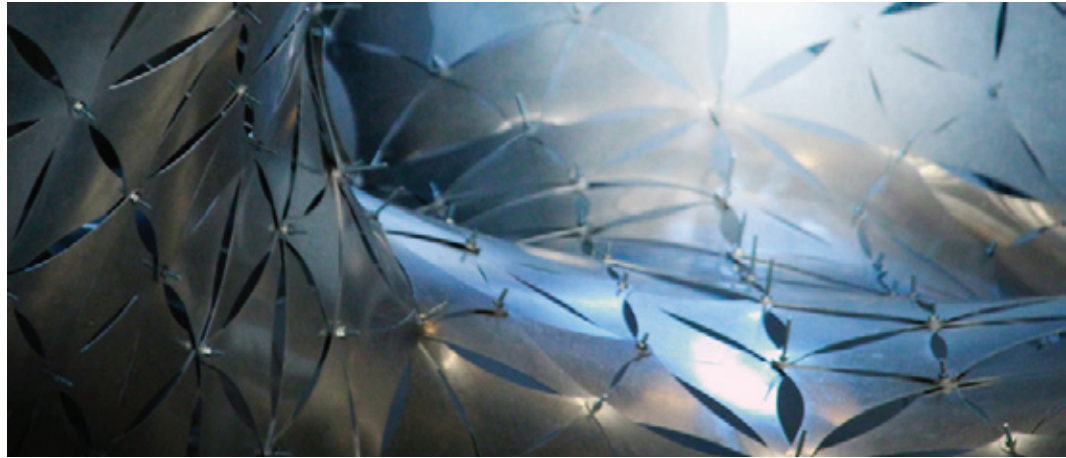
Workshop · 5-13 September 2011 · Aarhus School of Architecture

From 5 - 13 September Aarhus School of Architecture is hosting Digital Physical, an international workshop framing digital experimentation and architectural fabrication.

This workshop focuses on the relationship between experimental digital tools and computer controlled production.

The workshop will be organised as four independent tracks led by international and local experts.

Track #1 Architectural skins



Architectural Skins is led by Architect Daniel Piker, educated at the Architectural Association School of Architecture in London. Daniel Piker works with the development of Kangaroo Physics, an extension of the parametric modelling program Grasshopper which allows the treatment of physical principles and forces in digital form development.

*Foto:
Minimal complexity.
Vlad Tenu.*

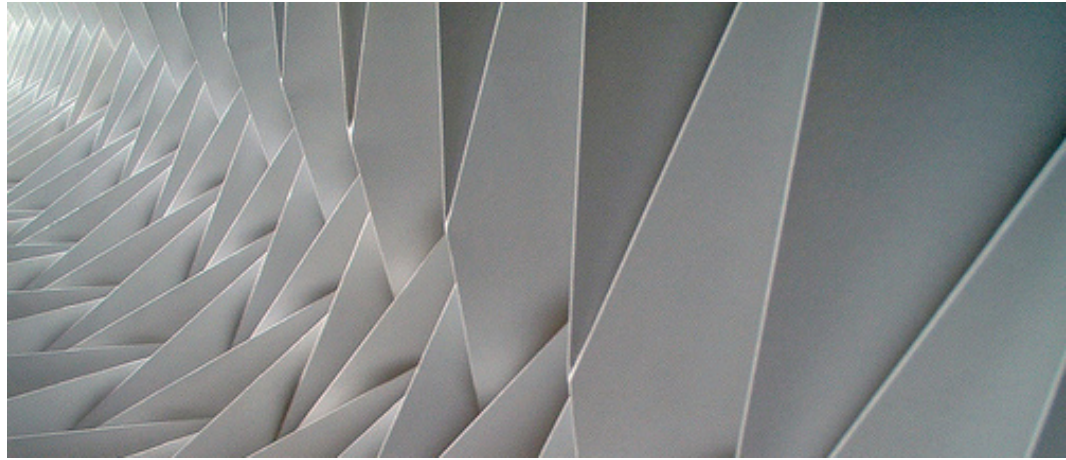
Architectural skins explores a rethinking of the architectural skin - the building envelope - based on new digital tools and computerised production. This track examines the production of digitally developed temporary architectural skins for the inner urban spaces during the Aarhus Festival.

Architectural Skins is based on Daniel Piker's research in "synthetic" material properties which result from the geometry of architecture rather than as a result of a digital simulation of physical materials. Whereas the simulation of physical material properties (flexibility, rigidity, elasticity) reproduces measured properties of physical materials, synthetic properties result from geometries/geometric properties which are based on production-technical possibilities and limitations. This facilitates a direct linkage between the production and creation of architecture and new principles of digital form-finding.

Participants will be instructed in the development of synthetic material properties using Rhino, Grasshopper and Kangaroo. The aforementioned principles will be applied for the design of parametric component systems which will be utilised as space-creating, covering Skins at the square Pustervig Torv. The design aims to investigate the capabilities of parametric systems for modulating light by means of variations in densities and perforation. The systems we design will be produced by laser cutting of prototypes in the course of the workshop.

Technical experience with the relevant software is not required. However, previous experience with Rhino and Grasshopper will be an advantage.

Track #2 Folded Structures



Folded Structures is led by Jan Buthke and Rune Brauer from OOOJA - architects who teach parametrics and advanced modelling in their daily work with OOOJA's vocationally-oriented supplementary education programme for architects.

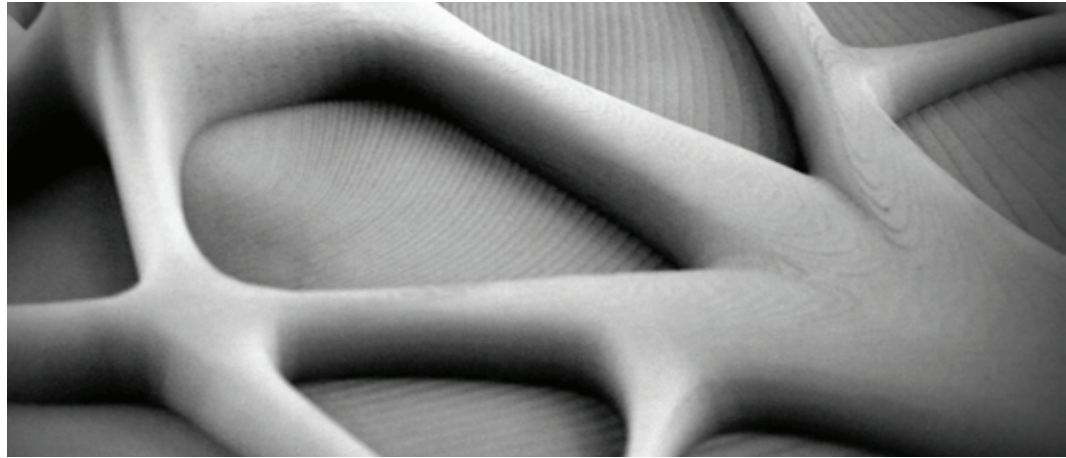
*Foto:
Pleated works in paper.
Richard Sweeney.*

Folded Structures examines the development of spatial plate structures based on a parametric interpretation of origamic principles of folding. The folding and bending of plates are methods for producing self-supporting spatial constructions which, by utilising the inherent rigidity of the plate material, simplifies the supporting principle and applies it to the individual material or component. By linking this logic with the possibilities of parametrics with regard to dynamic control of complex systems such spatial constructions can be adapted to specific contextual or functional demands by individualizing each element.

Folded Structures examines this connection between a part and the whole by converting the basic elements of the architectural geometry into parametrics: points, lines and surfaces. By defining dynamic relationships between the individual elements of the system an architectural control of the overall form will be developed. This logic is applied to the development of temporary artificial landscapes for Pier 2, the Port of Aarhus. Pier 2 represents a type of centrally located urban space which will remain undeveloped for a period of several years due to temporary restructuring. Folded Structures challenges this problem through the development of architectural landscapes which create spaces for temporary recreation, use and visits for the citizens of Aarhus.

Folded Structures is based on Rhino and Grasshopper, and the developed systems will be prototyped by laser-cutter and assembled by the participants in the course of the workshop. Technical experience with the programs in question is not required.

Track #3: Flux topologies



Architectural Skins is managed by Asbjørn Søndergaard, the Aarhus School of Architecture and Jelle Feringa, Hyperbody Research Group - TU Delft. Jelle Feringa is partner of EZCT Architecture, Design and Research, and is currently pursuing a PhD at the Technical University in Delft where he conducts research in robot-operated production, computational geometry and digital design theory.

Asbjørn Søndergaard manages Digital Experimentation at Aarhus School of Architecture and has been conducting research in morphogenetic processes and computer-based optimisation.

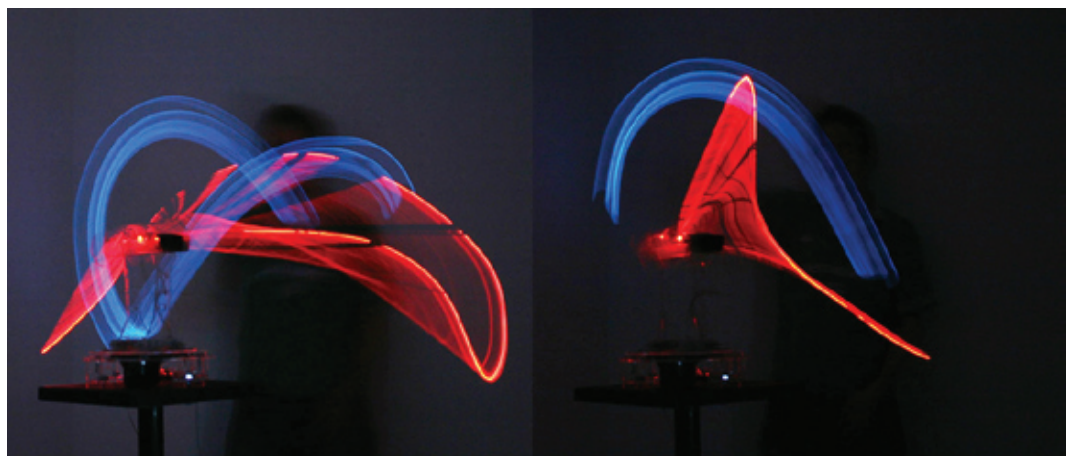
*Foto:
Unikabeton.
Per Dombernowsky og
Asbjørn Søndergaard.*

Flux Topologies examines the production of advanced architectural structures based on the combination of computational morphogenesis and robot operated filament-cutting. Computational morphogenesis is a self-organising digital form-finding process which creates new organic constructions through the redistribution of material in statically appropriate patterns. On the one hand, this process results in the creation of a new architectural language which demonstrates the trajectories of physical forces within a form. On the other hand, the Flux Topologies of material allows for more sustainable building processes. This results in architectural forms that achieve the best possible bearing capacity while using an absolute minimum of material.

Flux Topologies examines this method in relation to the development of spatial structures of rest areas for the planned light rail system in Aarhus. The investigation is based on the filament cutting of tectonic possibilities. Robot operated filament cutting is a simple yet effective way of producing complex forms. The workshop track investigates the spatial and sculptural potential of this process through the development of new morphogenetic constructions and architectural structures. The digital platform of the track is SolidThinking Inspired (computational morphogenesis/optimisation) and Rhino (design and production).

The participants will, independently but in groups, produce full-scale spatial prototypes using an IRB 2600 industrial robot operated by means of experimental specialised software developed by Jelle Feringa. Technical experience with the relevant software is not required.

Track #4: Behaving architectures



Behaving architectures is managed by Ruairi Glynn and Richard Roberts from Bartlett School of Architecture. Ruairi Glynn is an architect, writer, curator and installation artist. He also conducts teaching for MSc Adaptive Architecture & Computation and MArch Architecture at Bartlett, as well as for the MA TextileFutures and MA Industrial Design programmes at Central Saint Martins College, UAL. The work of Ruairi Glynn has been exhibited widely internationally: in Los Angeles, London, Seoul, New York, Sao Paulo, Vienna and Madrid. His research and work is located in the intersection between architectural robotics, performance and interactivity. Richard Roberts is an architect and teacher with Unit 14 at Bartlett with Stephen Gage.

Richard is an architect currently teaching on the Adaptive Architecture & Computation Masters course in the Bartlett Graduate School. He has lectured and exhibited internationally, including the Cambridge University Architecture lecture series, the Royal Danish Academy of Fine Arts, Copenhagen, the Institute of Architecture at the Angewandte University of Applied Arts, Vienna, The Eyebeam Institute in New York, the Bartlett School of Architecture, UCL, and the Graduate School, UCL.

*Foto: Signallers.
Ruairi Glynn.*

Behaving Architectures investigates the architectural potential of interactive responsive systems. While architecture historically has manifested itself through static structural bodies, fourdimensional, responsive architecture adds a new dimension to design by combining sensors, motors and space: a cybernetic, architectural behaviour, displaying character and artificial personality, reflecting the human capacity of observation, contemplation and reaction to its surroundings.

With the exception of periodic events such as the Aarhus Festival, which temporarily invigorates the space of the urban centre, several of the central squares of Aarhus are deserted. Through making and design, Behaving architectures aims to create a new, urban population by means of the development of architectural characters which occupy, manipulate and gesticulate within the spaces of social interaction. As self-promoting event-makers, mocking and luring out new life and activities outside opening hours, these characters will approach the inhabitants of the space through languages of non-verbal communication. With Bispetorv square as a contextual frame, Behaving Architectures investigates the interaction between bodily perception and orientation and cybernetic architectonics which react to human stimulus.

This workshop will facilitate the development of interactive tectonic structures by combining motors, sensors and movable systems. The technical platform of the track will be Arduino-boards, which will be assembled and programmed by the participants during the workshop.

Program

Monday 5/9/2011

08.00	IT-support and installation of software,	IT-department
09.00	Introduction to the workshop,	Main auditorium
09.30	Teaching session 1, track 1 – 4,	individual lecture rooms
11.00	Supervised group-based project work,	Udstillingsbygning+ Mock-up
13.00	Teaching session 2, track 1 – 4,	Individual lecture rooms
14.00	Supervised group-based project work,	Udstillingsbygning+ Mock-up
20.00	Supervision, pin-up 1,	Individual lecture rooms

Tuesday 6/9/2011

09.00	Teaching session 3, track 1 – 4,	individual lecture rooms
11.00	Supervised group-based project work,	Udstillingsbygning + mock-up
20.00	Supervision, pin-up 2,	individual lecture rooms

Wednesday 7/9/2011

09.00	Supervised group work	Udstillingsbygning + mock-up
16.30	Ruairi Glynn and Richard Roberts: <i>Interactive architecture</i>	Main auditorium
20.00	Supervision, pin-up 3	individual lecture rooms

Thursday 8/9/2011

09.00	Supervised group-based project work	Udstillingsbygning + mock-up
16.30	Jelle Feringa: <i>The promotion of the architectural model</i>	Main auditorium

Friday 9/9/2011:

09.00	Supervised group-based project work starting of production Daniel Piker: <i>Synthetic behaviors</i>	Udstillingsbygning + mock-up Main auditorium
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Program

Saturday 10/9/2011

09.00 Supervised digital production Individual workshops

Sunday 11/9/2011

09.00 Supervised digital production Individual workshops

Monday 12/9/2011

09.00 Critique Individual lecture rooms

16.00 Establishing the exhibition Udstillingsbygningen

Tuesday 13/9/2011

11.00 Closed jury evaluation Udstillingsbygningen

15.00 Exhibition preview, the handing over of
Results of assessments, prize presentation
by Rector Torben Nielsen Udstillingsbygningen

17.00 End-of-workshop celebration, Udstillingsbygningen

Individual auditoriums

Track # 1: Architectural Skins Main auditorium

Track # 2: Folded Structures Laden Nord

Track # 3: Flux topologies Mock-up + Kaløgade

Track # 4: Responsive architectures Studsgade auditorium

Individual workshops

The Mock-up Room

Udstillingsbygningen - the exhibition building

The digital workshop, located above the wood-workshop



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