

Laboratory for Timber Constructions

Innovative Timber Constructions

Yves Weinand, Associate Professor

IBOIS | EPFL | Lausanne

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Belgique

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www.weinand.be

2007 Pont pédestre sur l'Our,

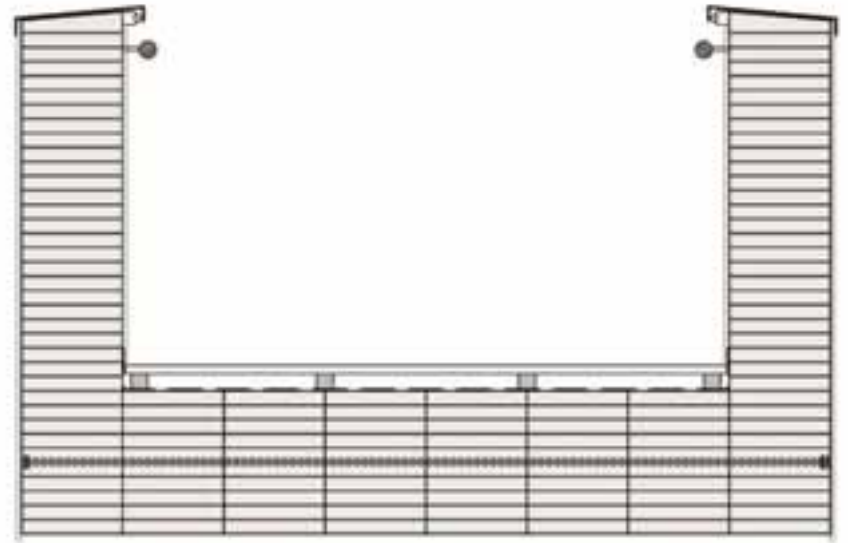
Burg Reuland

Maître d'ouvrage : Commune de Burg-Reuland

Architecte: association momentanée

Michaelis-Weinand, Espeler

Ingénieur: bureau d'études Weinand



2006 Patinoire, Liège

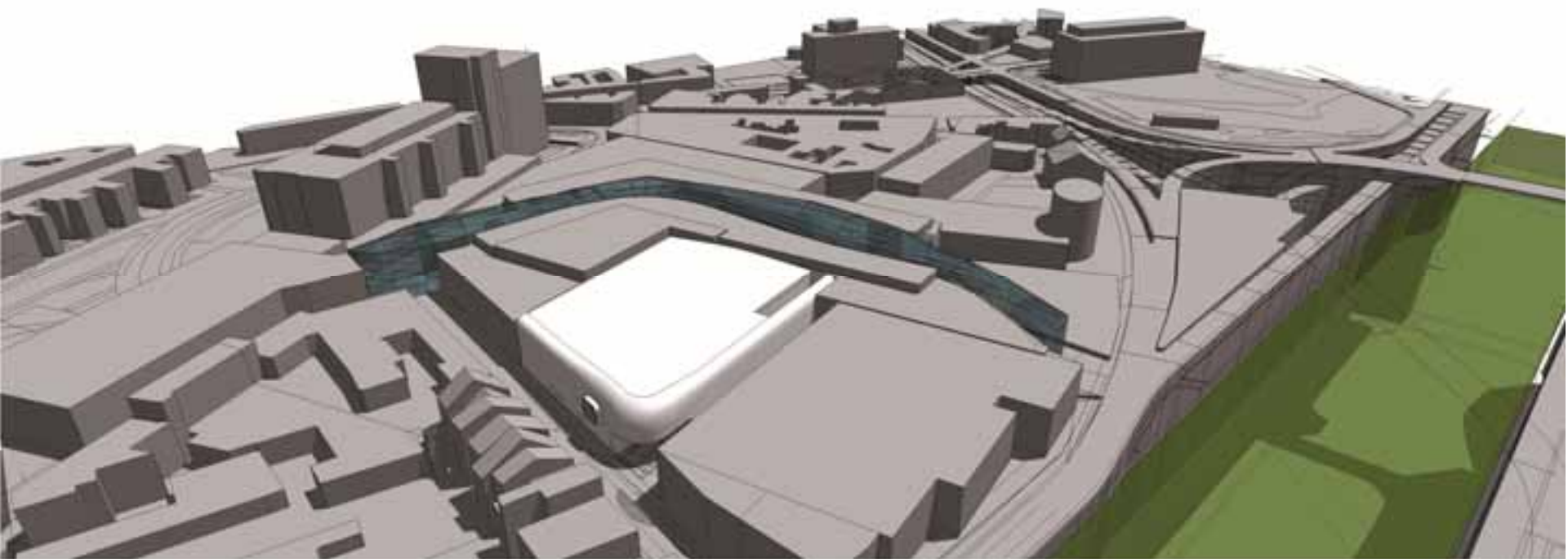
Maître d'ouvrage : Ville de Liège

Architecte: association momentanée Escaut-Weinand

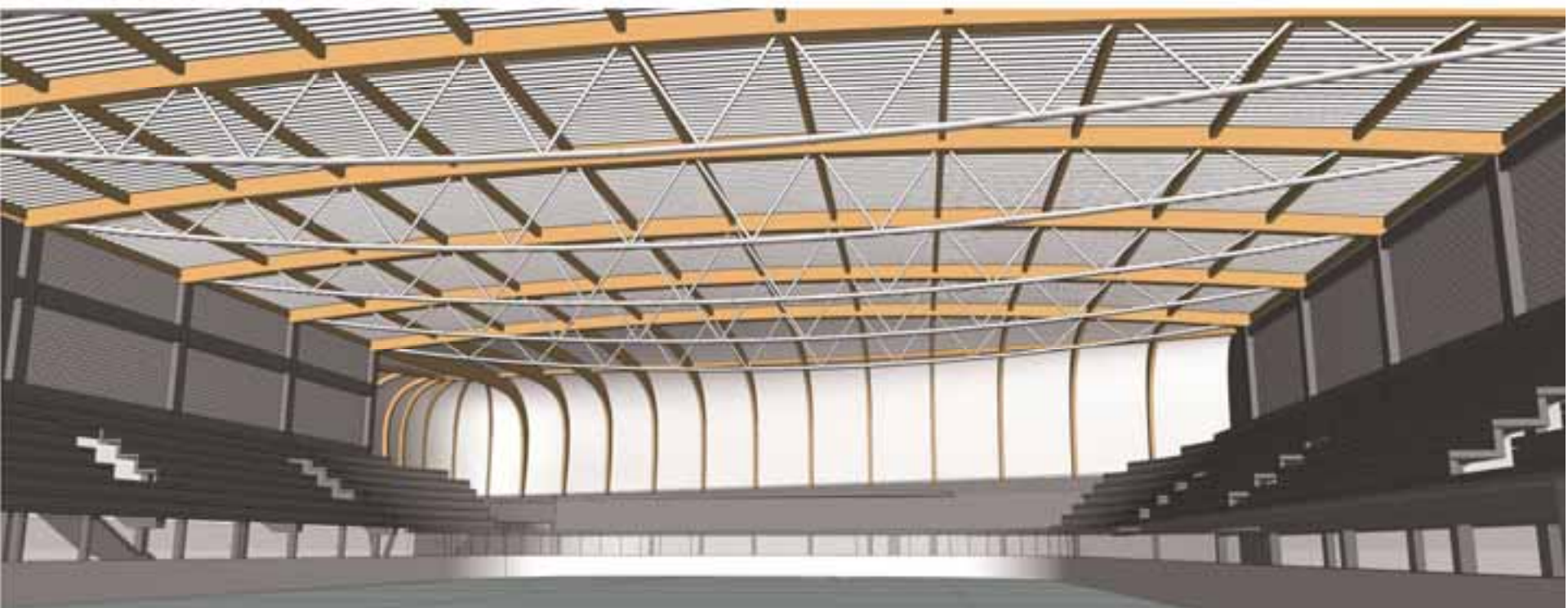
Ingénieur: bureau d'études Weinand

Surface utile : 4700 m²,

Coût estimé : € 7'200'000,-



La charpente principale est composée de 8 poutres treillis en bois lamellé collé sous-tendues par des tirants métalliques qui confèrent à la structure sa légèreté.



2003 Musée de la photographie, Charleroi

Maître d'ouvrage : Communauté française de Belgique

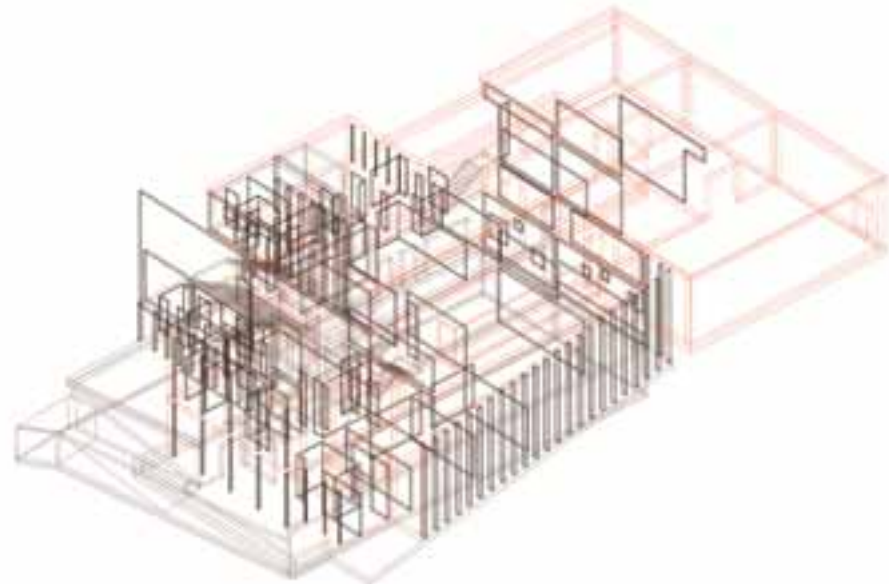
Belgique

Architecte: Escaut Architecture, Bruxelles

Ingénieur: Bureau d'études Weinand

Surface utile : 2450 m²

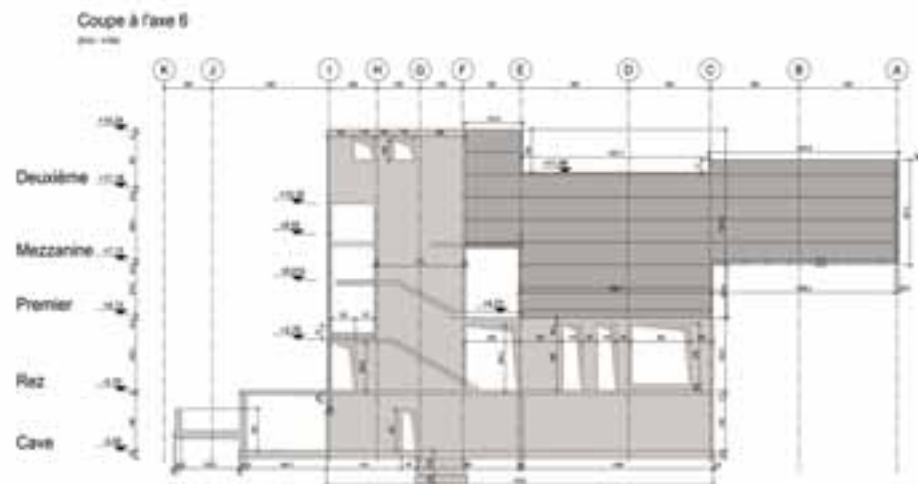
Coût estimé : € 3'000'000,-



Innovative Timber Constructions

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L'architecture de l'extension du musée de la photographie à Charleroi est un exemple d'application innovante d'architecture et d'application du matériau bois. Des panneaux en bois massif et contrecollés sont mis en oeuvre pour réaliser un étage en porte-à-faux. Sur le plan économique la variante bois bat la variante en béton initialement prévu. Il s'agit d'une approche interdisciplinaire qui lie les réflexions d'espace à celle relatives à la structure du bâtiment.







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2005, Complexe funéraire, Welkenraedt

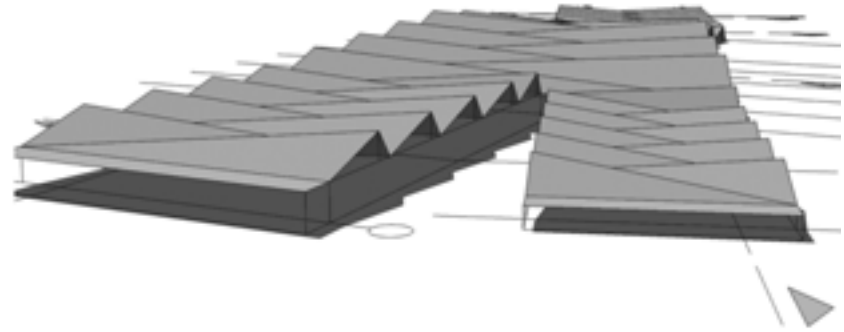
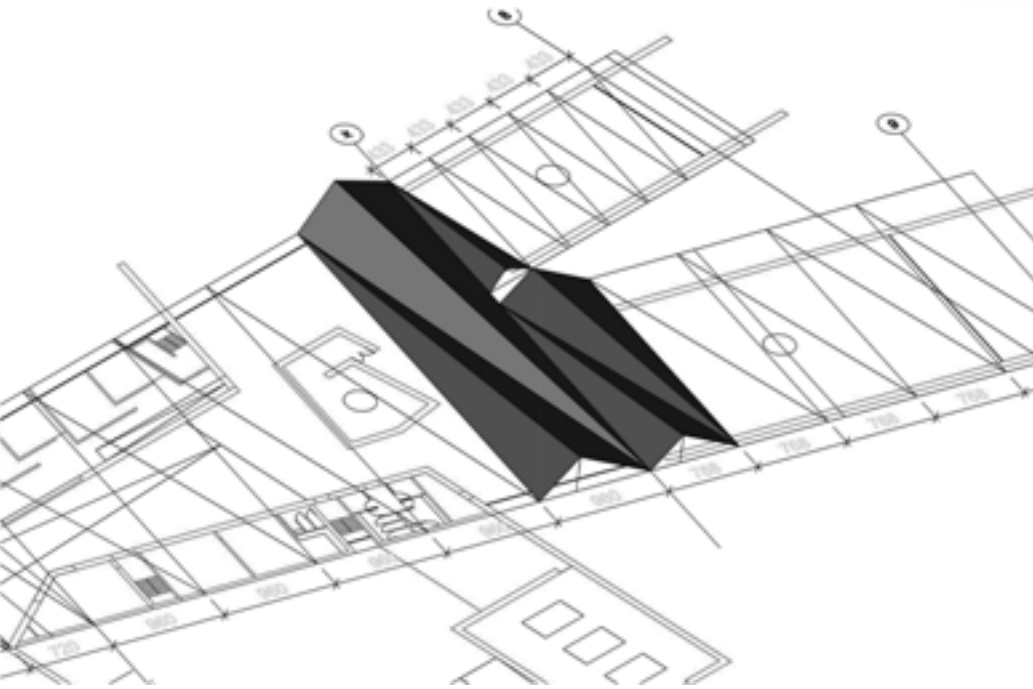
Maître d'ouvrage : Intercommunale du centre funéraire de Liège et environs (CFR)

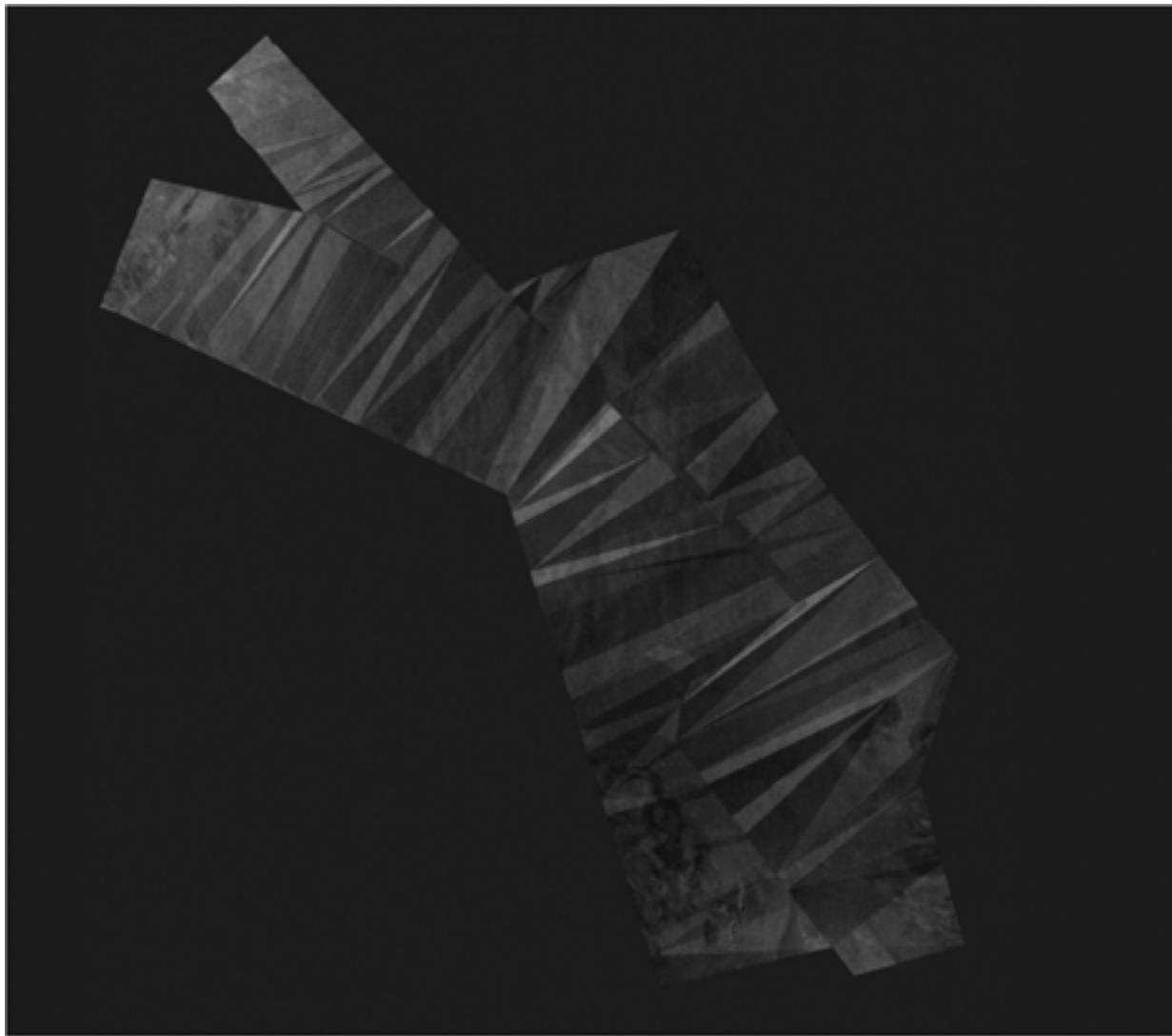
Architecte: Association momentanée Dethier - Weinand

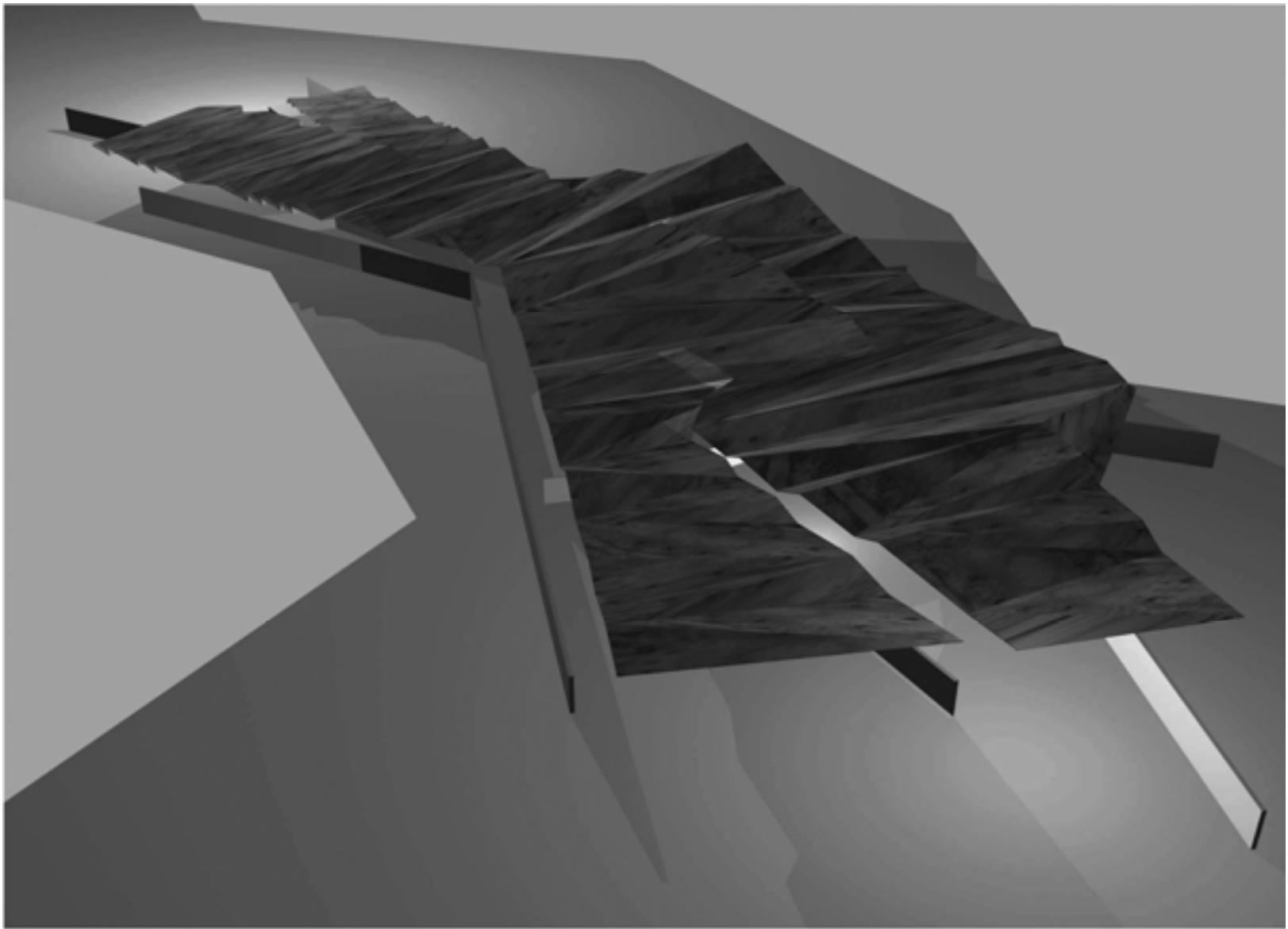
Ingénieur: Bureau d'Etudes Weinand

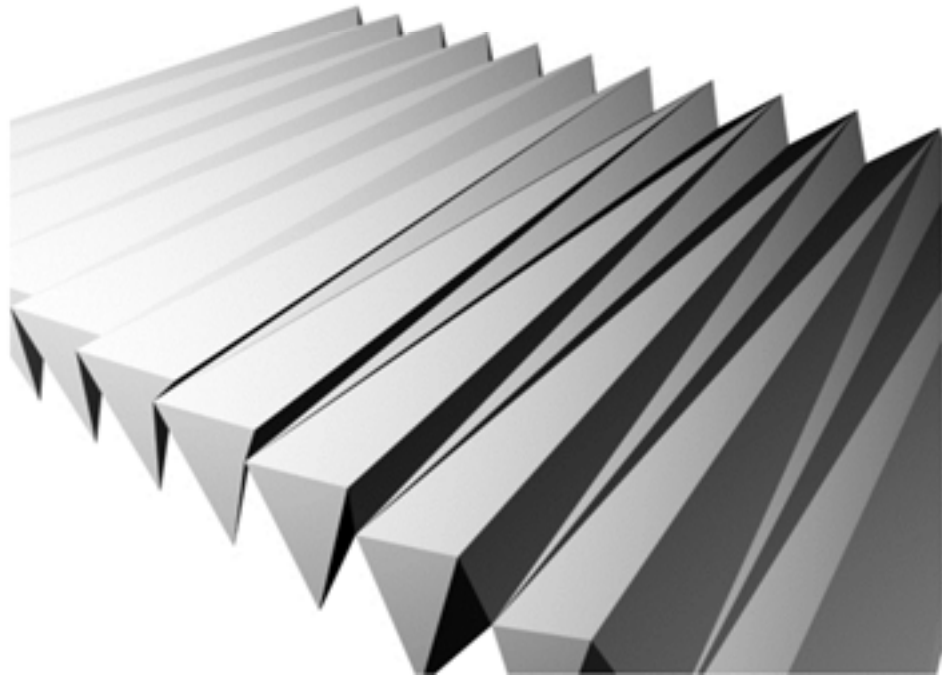
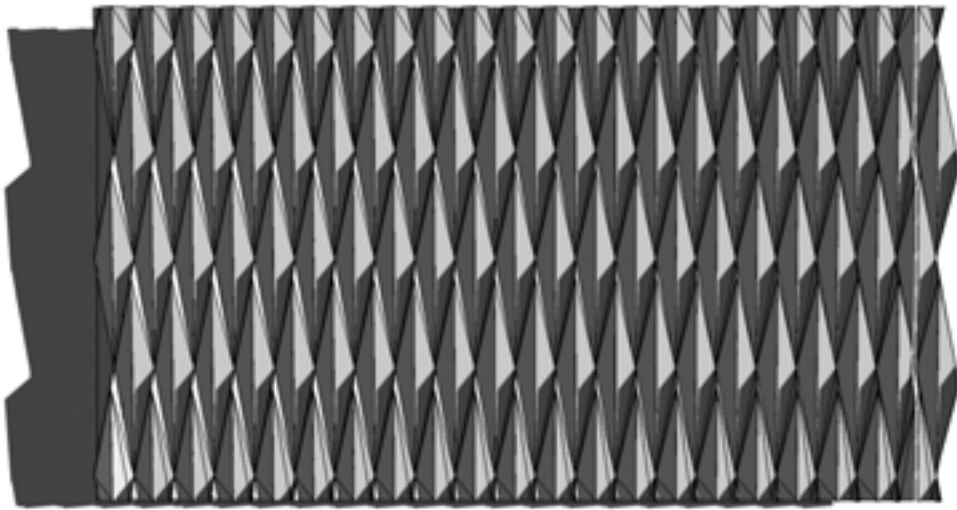
Surface utile : +/- 5000 m²,

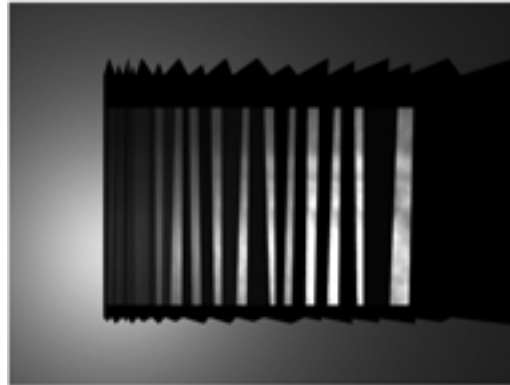
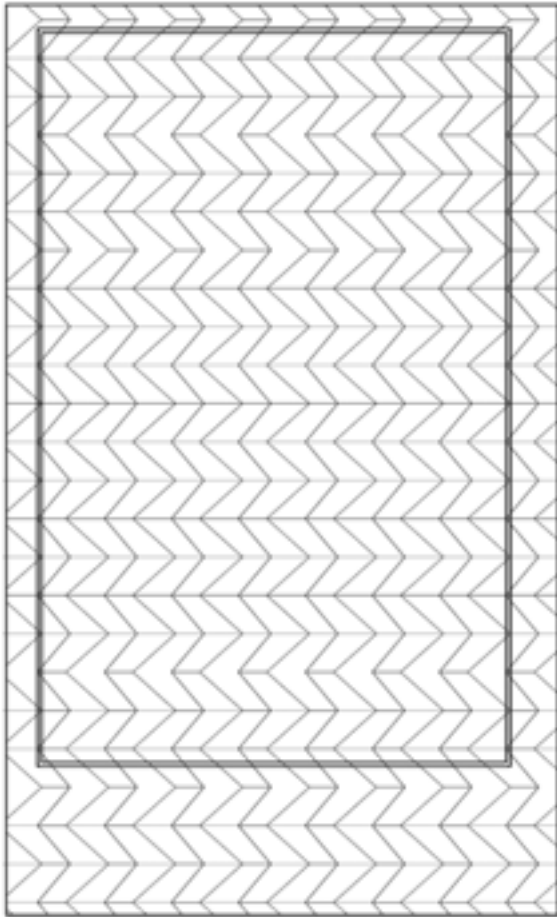
Coût estimé € 5'100'00,-



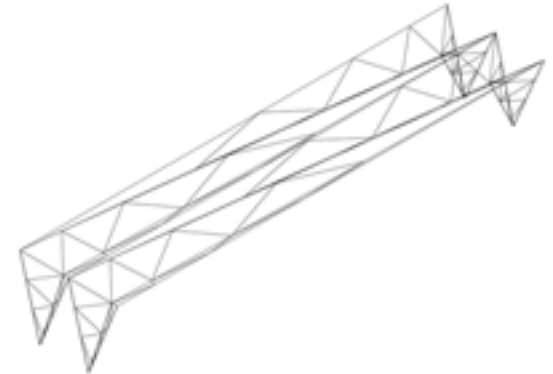
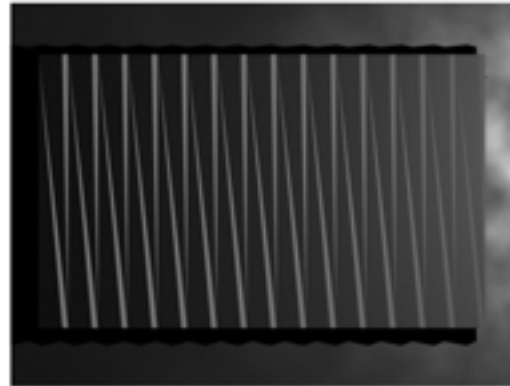




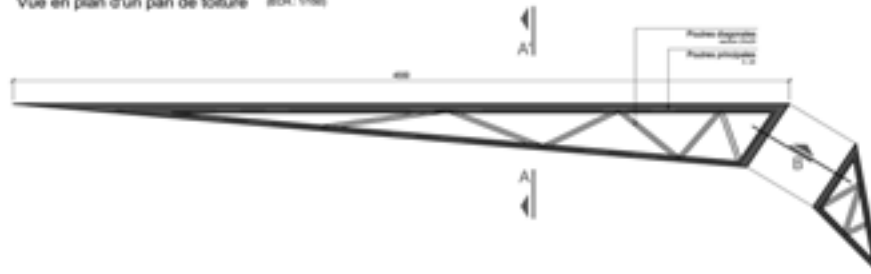




GÉOMÉTRIE
Module tridimensionnel



STRUCTURE
Vue en plan d'un pan de toiture (SDH, 1/100)



2006, Salle de sport, Yverdon

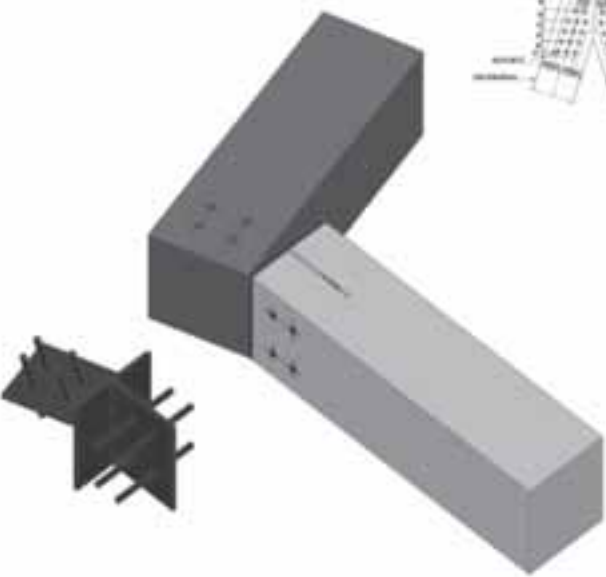
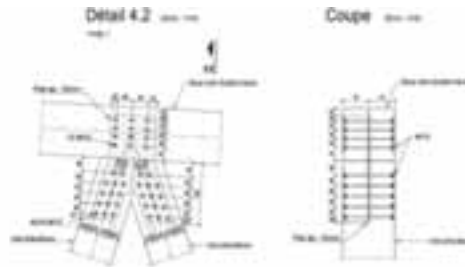
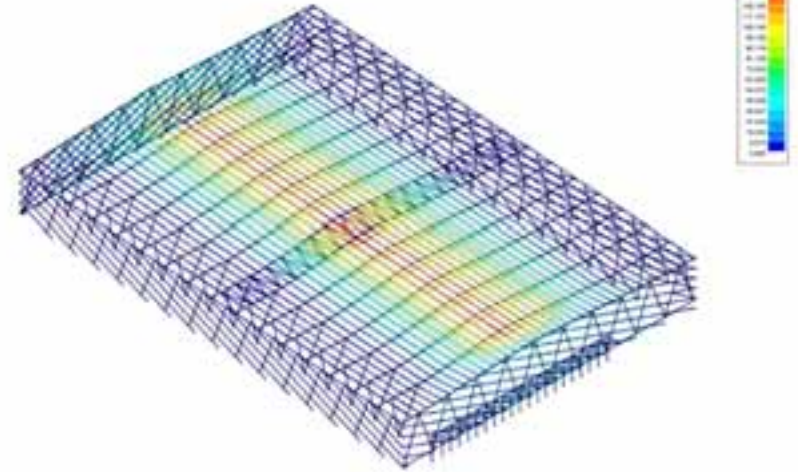
Maître d'ouvrage : Commune d'Yverdon

Architecte: Ueli Brauen & Doris Wälchli avec Yves Weinand

Ingénieur: Bureau d'Etudes Weinand

Surface utile : 2866 m²

Coût estimé : CHF 14'000'000,-

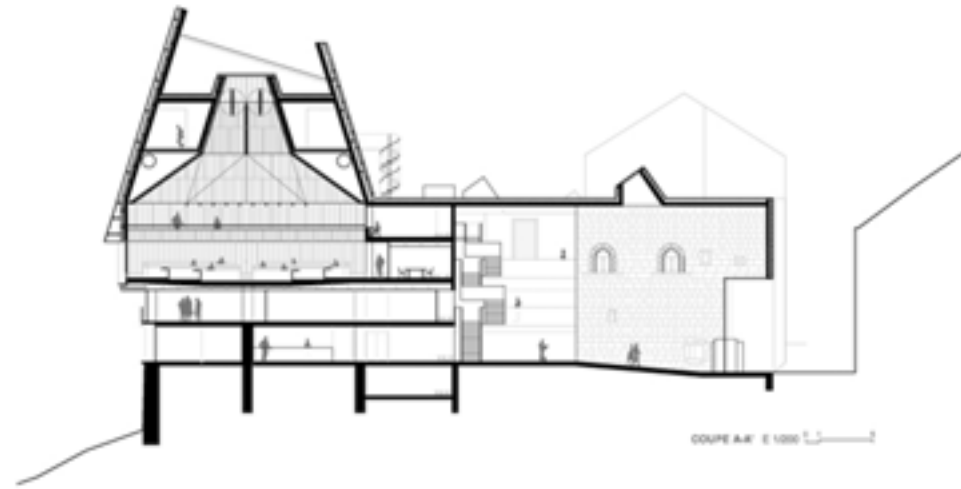


2009, Parlement

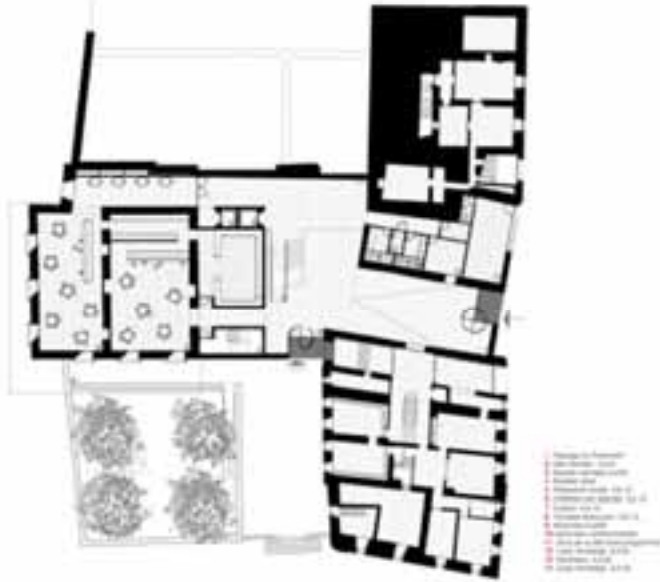
Maître d'ouvrage : Canton de Vaud

Architecte: Atelier Cube / Bonell & Gil

Ingénieur: Bureau d'Etudes Weinand



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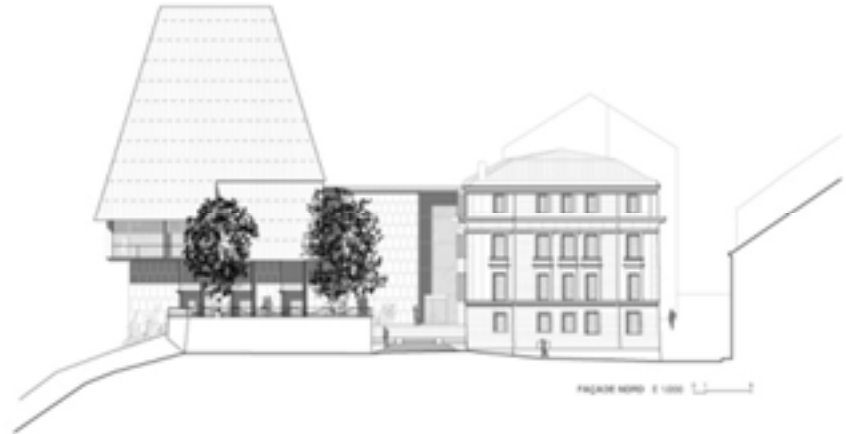
ANNEXE 1 - PLAN (1/1000)



ANNEXE 2 - PLAN (1/1000)



FAÇADE NORD 1/1000 (1/2)



FAÇADE NORD 1/1000 (1/2)

REVÊTEMENT EXTÉRIEUR DE FEUILLES DE CUIVRE AU SUD-OUEST

LAME D'AIR FORMÉE PAR TOIT À PROFIL DE

ISOLATION

PANNEAUX EN BOIS MASSIF CONTRÔLÉS

ASPIRATION HAUTE AIR CHAUD

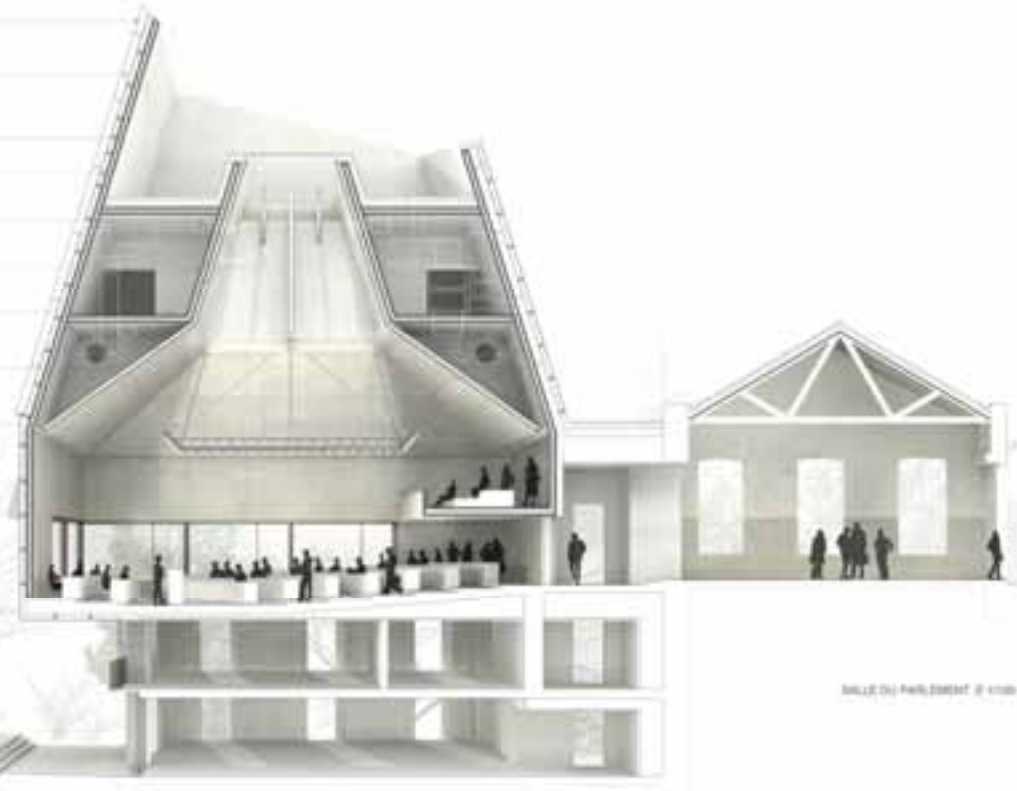
LAMES DE CONTRÔLE DE L'ÉCLAIRAGE NATUREL

ESPACE MÉDIANES VENTILATION ET CHAUFFAGE

SOLÈNE TECHNIQUE REPRISÉ D'AIR

ASPIRATION BASSE AIR CHAUD

PANNEAUX EN BOIS MASSIF CONTRÔLÉS LE
UTILISÉS COMME SURFACES FINIES



SALE DU PARLEMENT 2 4100 1 1 1 1 1

À ÉNERGIE DE LA DÉMOCRATIE EST DANS LES PERSONNES, LE CAIRE PHYSIQUE DOIT LE SUIVRE.

IBOIS

Laboratory for timber constructions

Direction

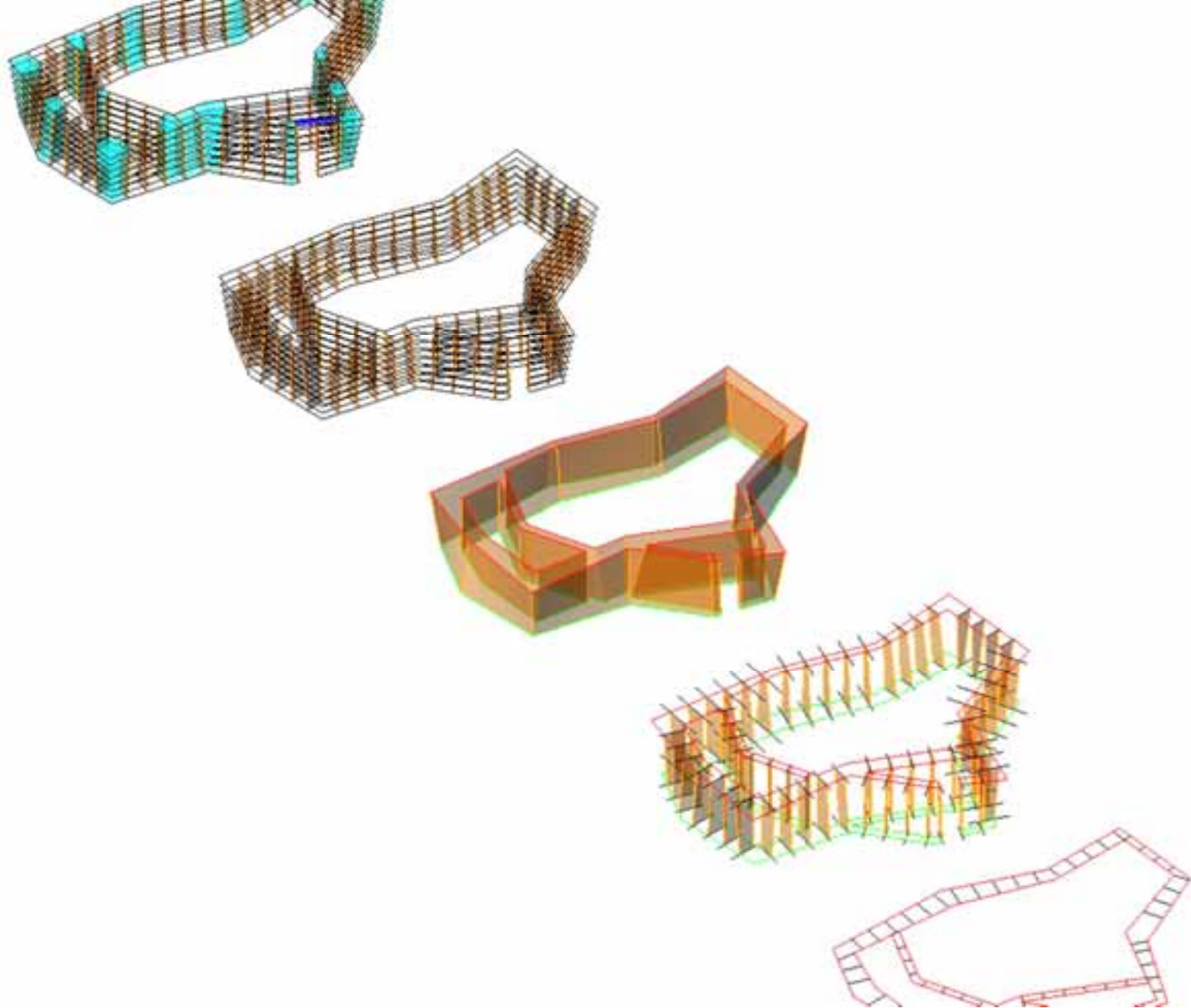
Prof. Yves Weinand, ISA architect, EPFL civil engineer,
Associate Professor

Administration

Hildegard Bachmann, secretary

Collaborators

Hani Buri, EPFL architect, scientific collaborator
Gilles Gouaty, DEA EDIIS Lyon (F) computer scientist, PhD assistant
Markus Hudert, Städelschule Frankfurt (D) architect, PhD assistant
Johannes Natterer, EPFL SIA civil engineer, PhD assistant
Ivo Stotz, EPFL architect, PhD assistant
François Demoures, EPFL, mathematician, PHD assistant
Masoud Sistaninia, Iran University of Science and Technology, Teheran
mechanical engineer, PHD assistant





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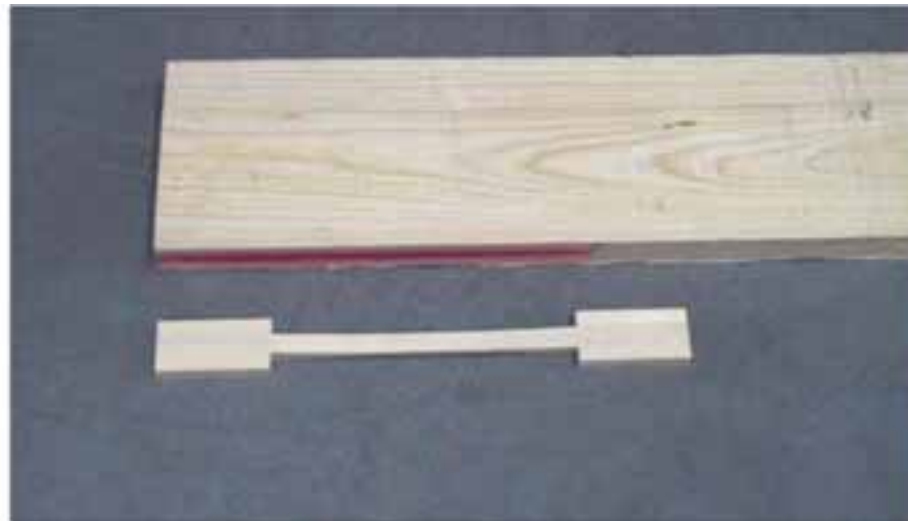
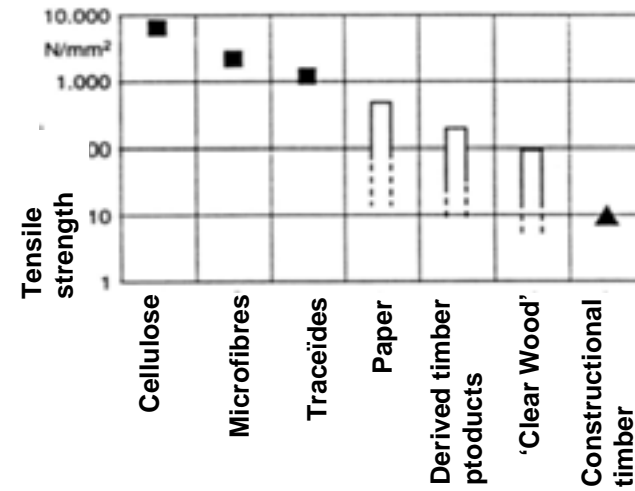


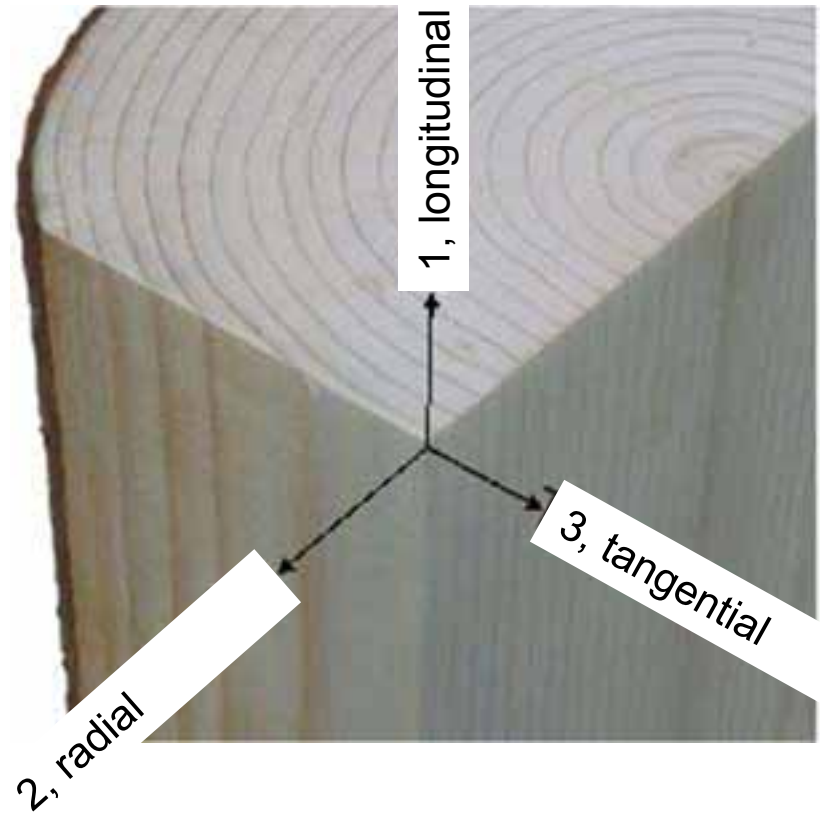
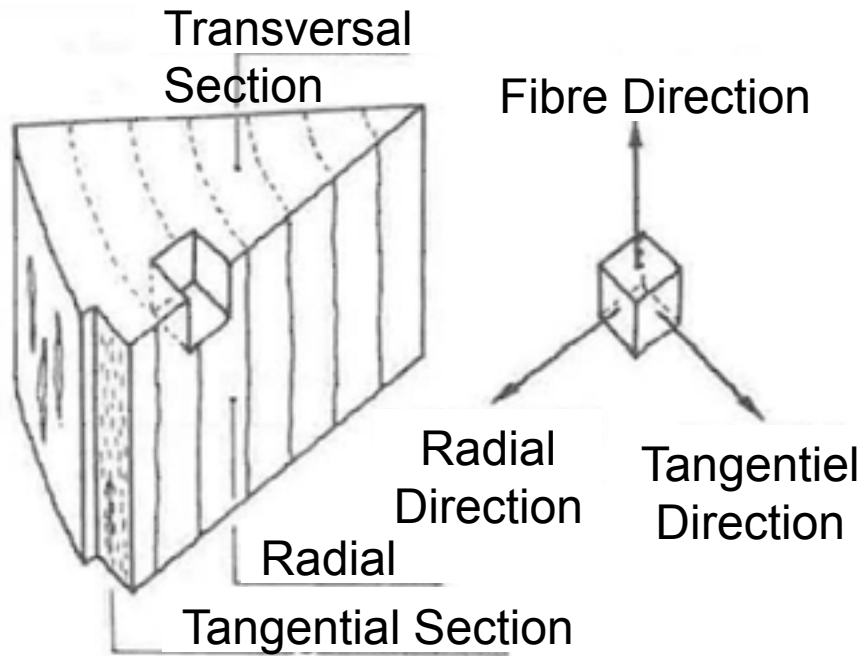
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**Characteristic values of spruce
[P. Niemz, 1993 and P. Glos, 1981]**

Characteristic properties	Small Specimen	Constructional Element	Difference to the small specimen
Bending Strength (mean value [N/mm ²])	68	37	46%
Tensile Strength parallel to fibers (mean value [N/mm ²])	80	30	63%
Compression Strength parallel to fibers (mean value [N/mm ²])	40	32	20%

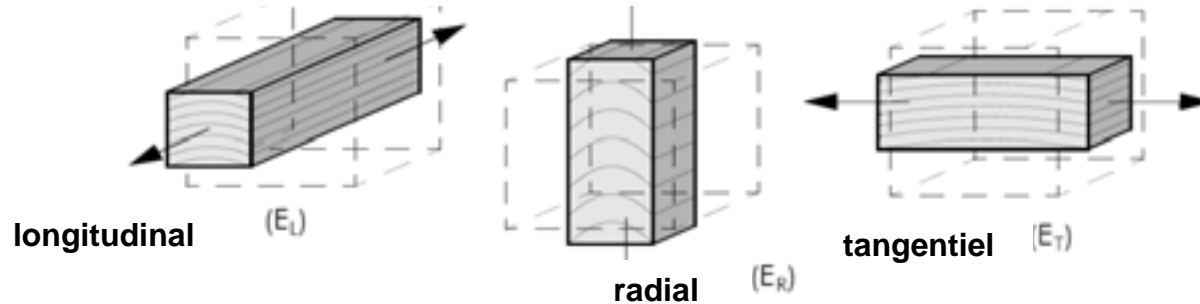
Mecanical Properties [Glos 1999]



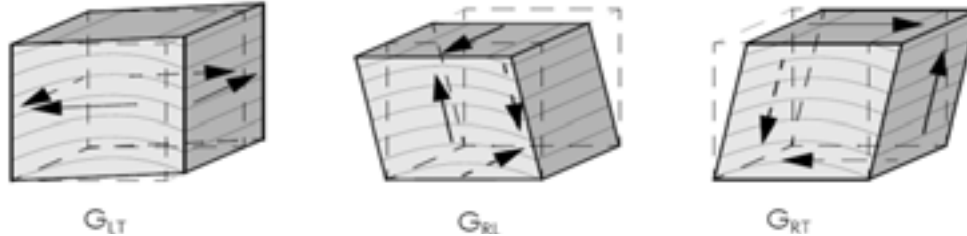


Definition of the circular orthotropic coordinate system [Schickhofer 2005]

Elasticity modulus E – normal deflection:



Shear modulus G – shear deflection:



Elasticity Modulus E (in **T**angential, **L**ongitudinal and **R**adial direction)

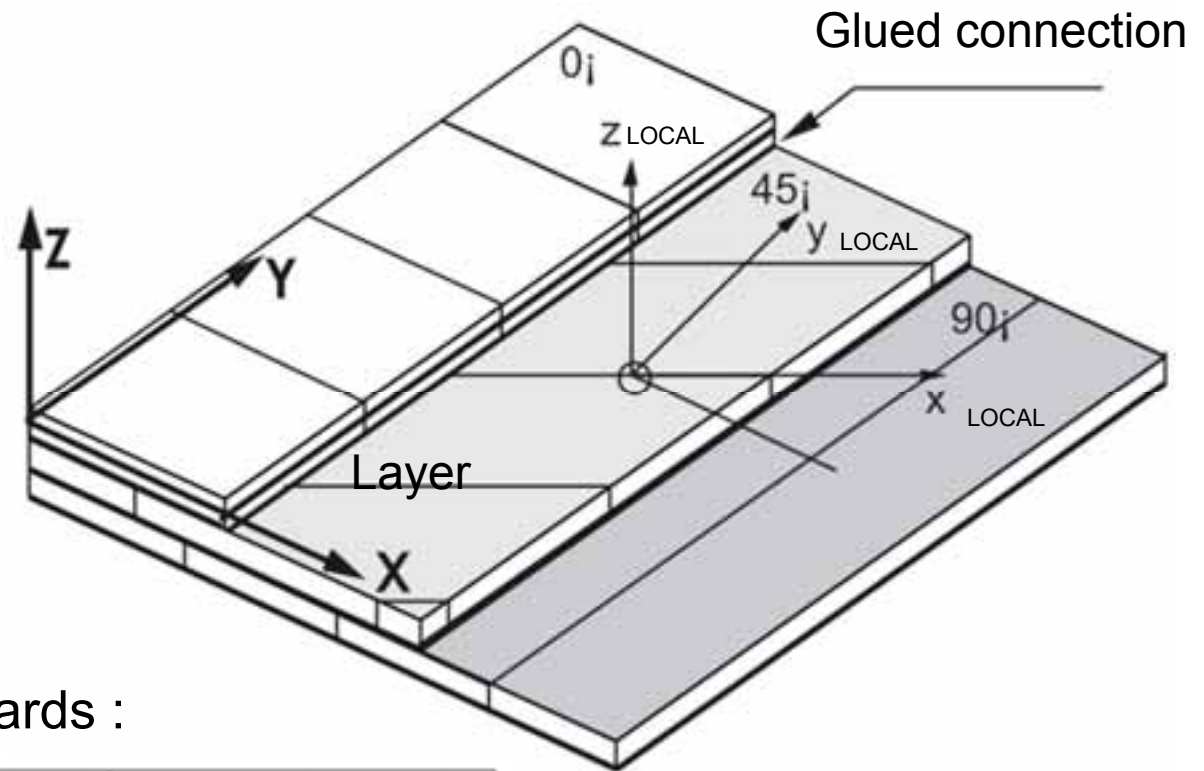
$$E_T \div E_R \div E_L = 1 \div 1,7 \div 20 \quad (\text{Soft Wood})$$

$$E_T \div E_R \div E_L = 1 \div 1,7 \div 13 \quad (\text{Hard Wood})$$

Shear Modulus G (in **T**angential, **L**ongitudinal and

Radial $G_{LR} \div G_{LT} = 1 \div 1$ (Soft Wood)

$$G_{LR} \div G_{LT} = 1,3 \div 1 \quad (\text{Hard Wood})$$



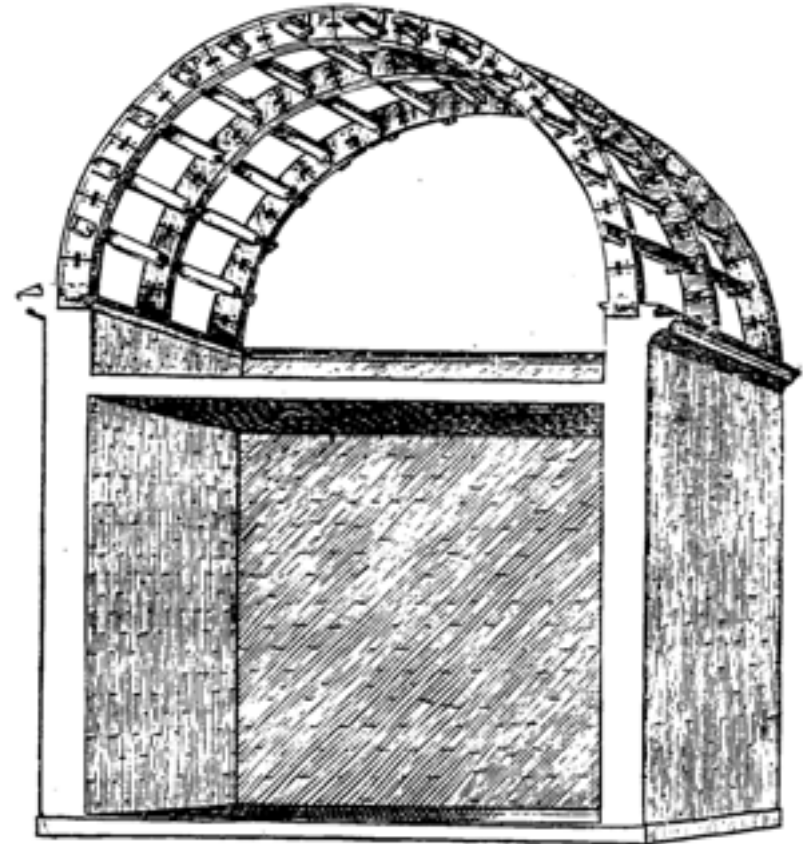
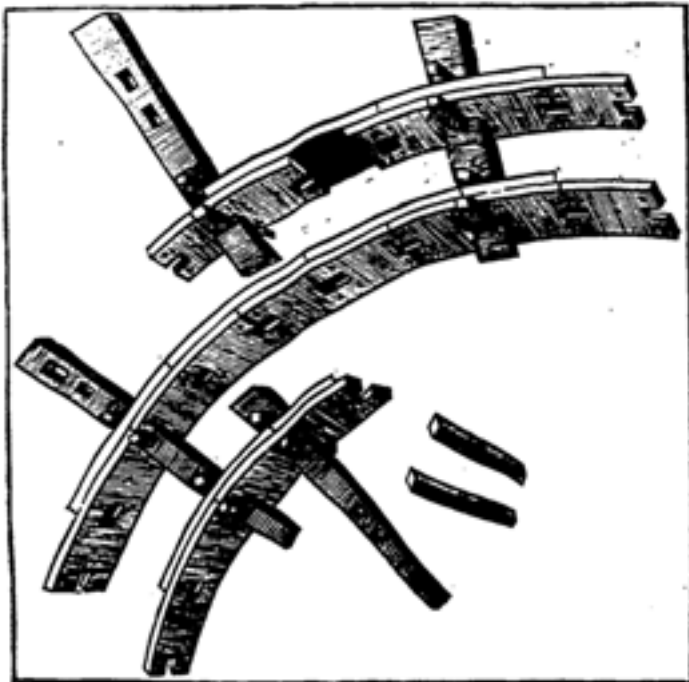
Three-layered timber boards :

E Modulus [N/mm ²]	Thickness [mm]	Fiber Orientation [deg]
$E_1 = 12000$	$t_2 = 24$	$\alpha_1 = 0$
$E_2 = 10000$	$t_2 = 15$	$\alpha_2 = 45$
$E_3 = 12000$	$t_3 = 24$	$\alpha_3 = 90$

[Schickhofer 2005]

Philibert de l'Orme

Construction detail

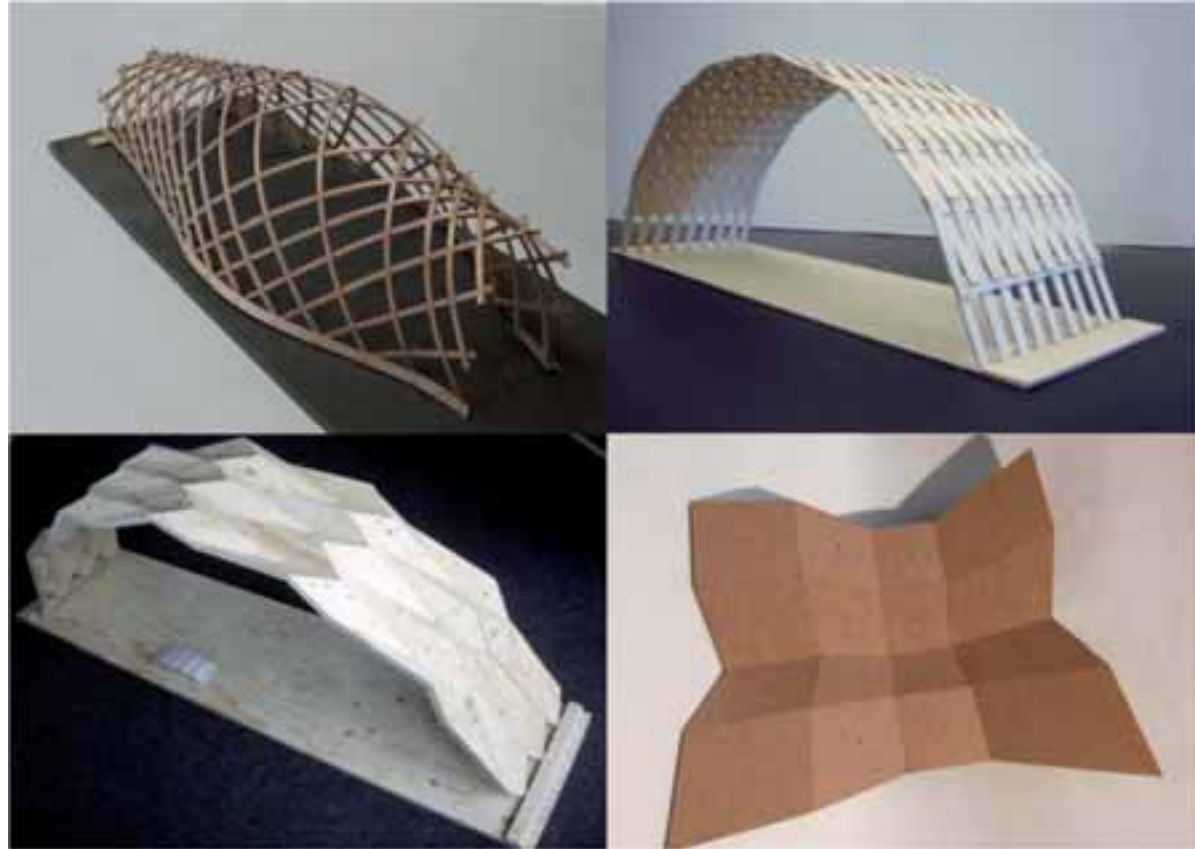




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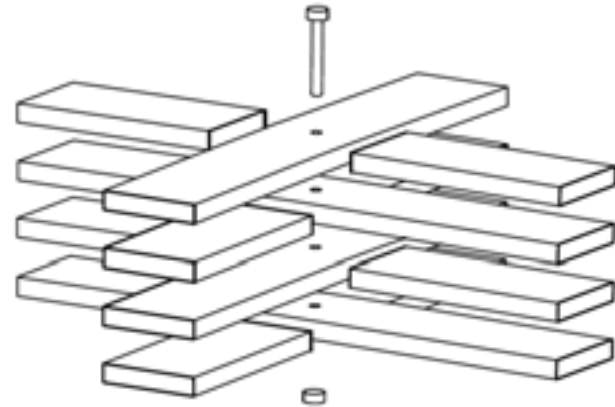
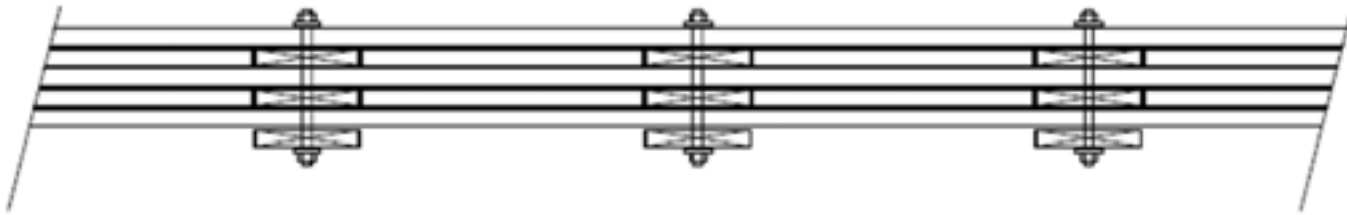
Research at Ibois

Free form shell structures



Structural behavior of rib shells

Construction detail



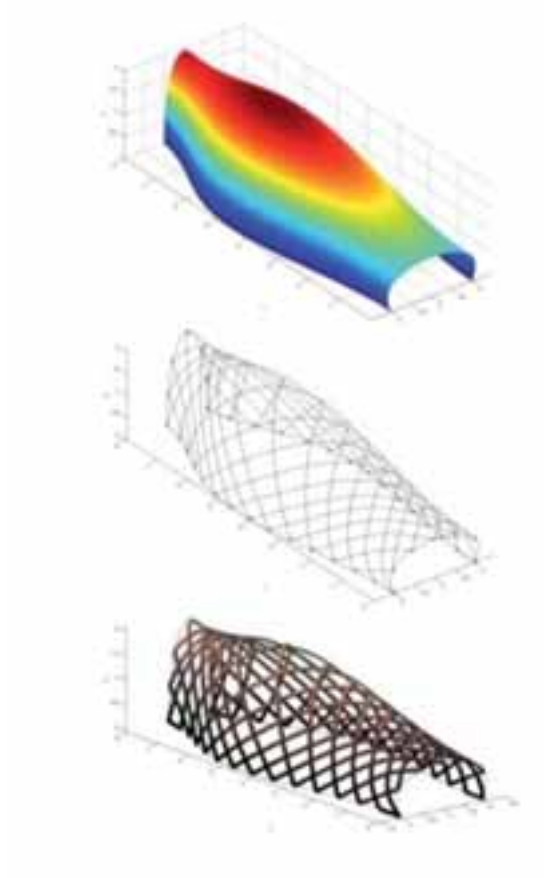
Johannes Natterer

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Yves Weinand



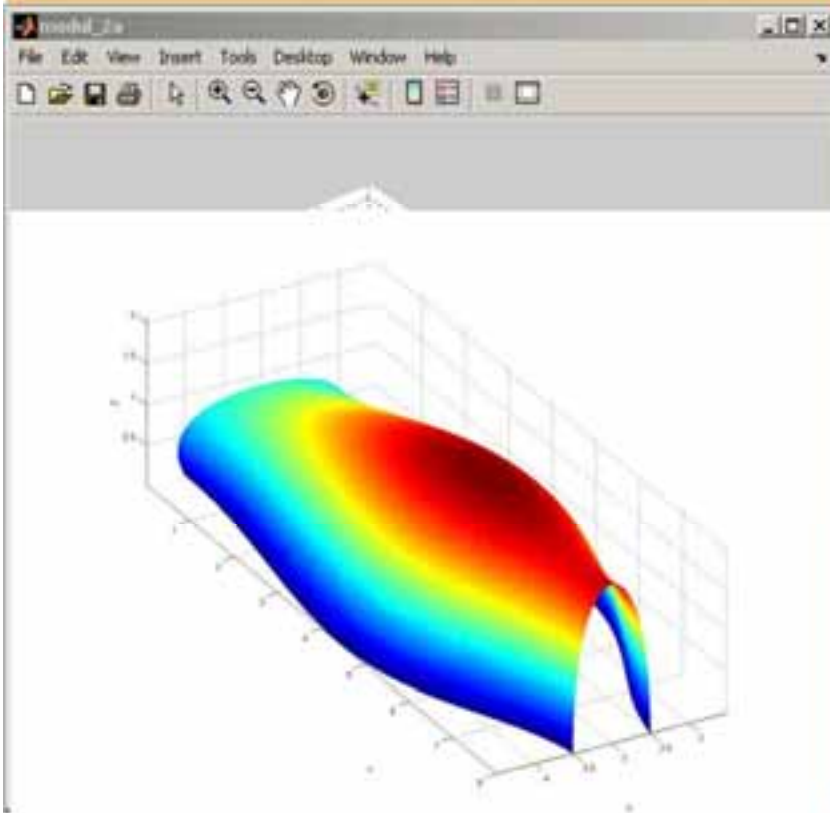
GEOS

Build rib shells on free-form surfaces



Claudio Pirazzi

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API Surface

List of built in surfaces

Themed:

Ground Dimension: Xmax = Ymax =

Number of Control Planes:

Control Points per Plane:

List of project surfaces

model_2a

Apply

Plane Animator

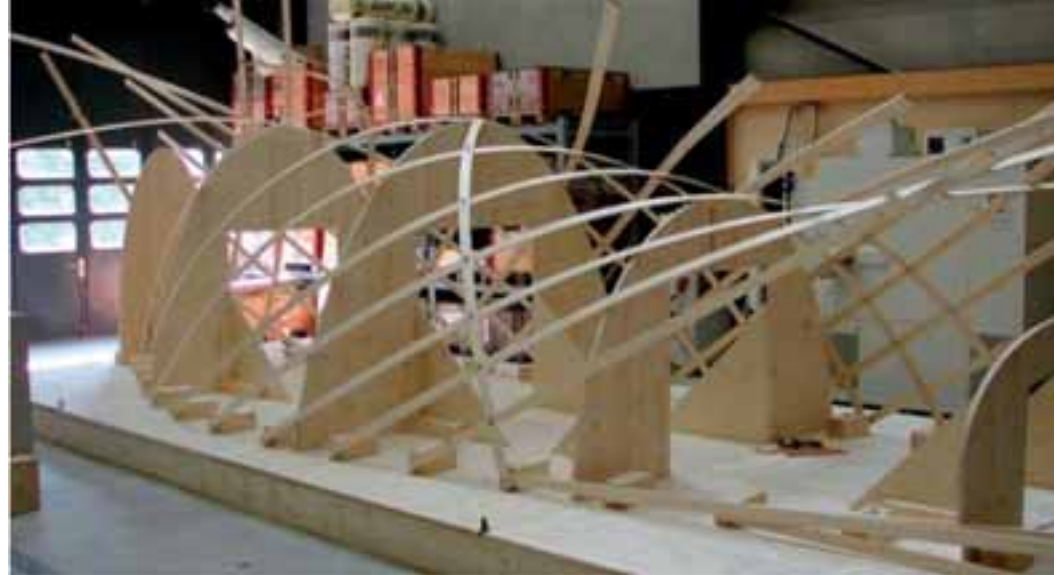
Plane n°

Control Points of the Selected Plane

Y = **Set-y** X = Z = **Set-xz**

Yslice = **Set-yslice** Slice on Axis Auto

Slice off Axis Equal



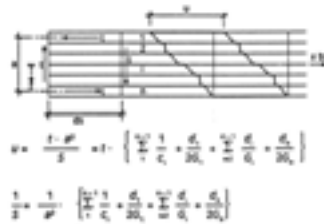
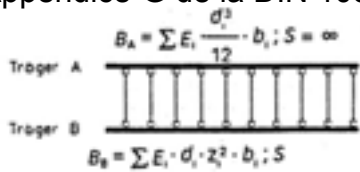
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Multi-Layer beams with inter-layer-slip theories

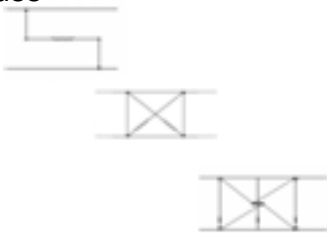
Method gamma

$$I_{ef} = \sum_i^m I_i + \sum_i^m \gamma_i A_i a_i^2$$

Appendice-G de la DIN 1052

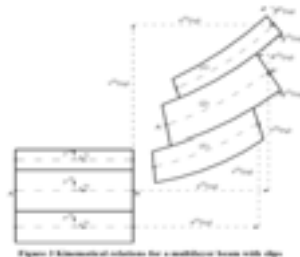


Truss



Finite element

2n+1 degrees of freedom



Johannes Natterer

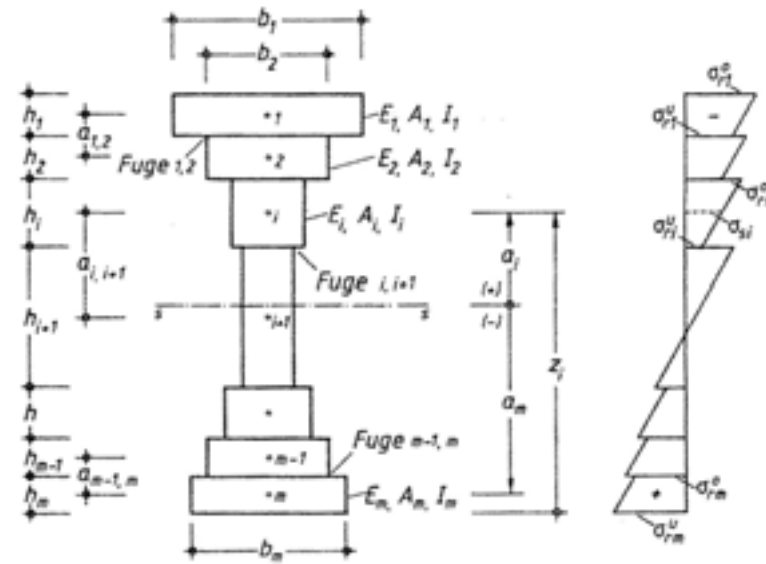
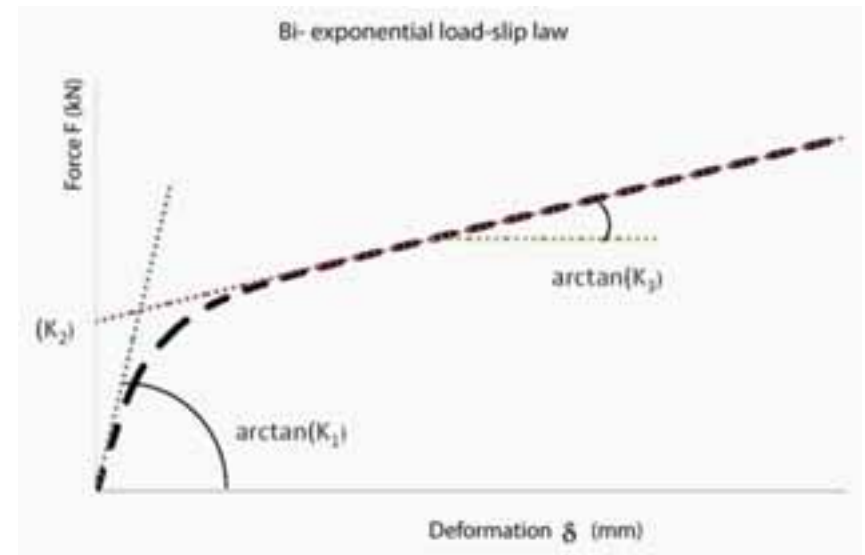
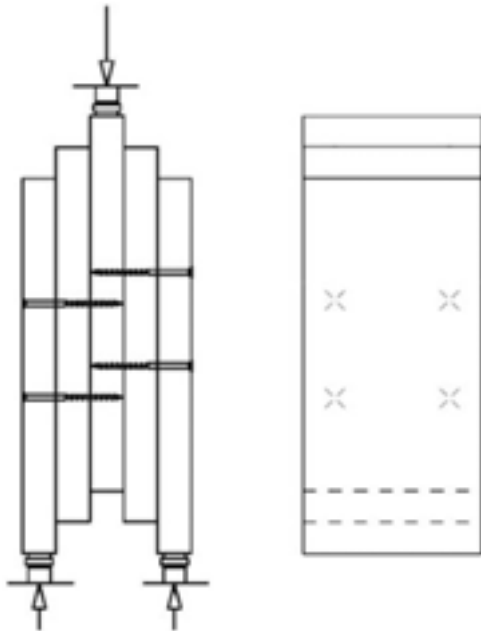


Figure 2 Elementarrelationen für ein ebener Truss mit Slip

Test

Stiffness of the joints



Johannes Natterer

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Structural behavior of rib shells

Develop a finite element

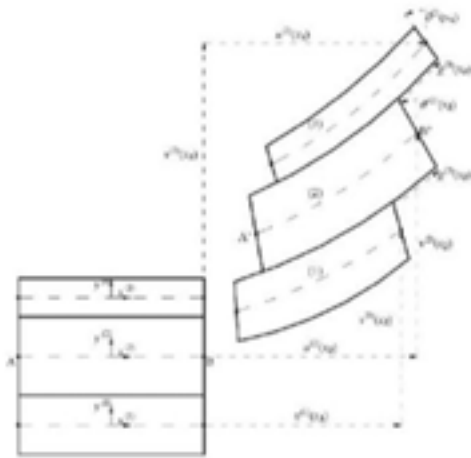
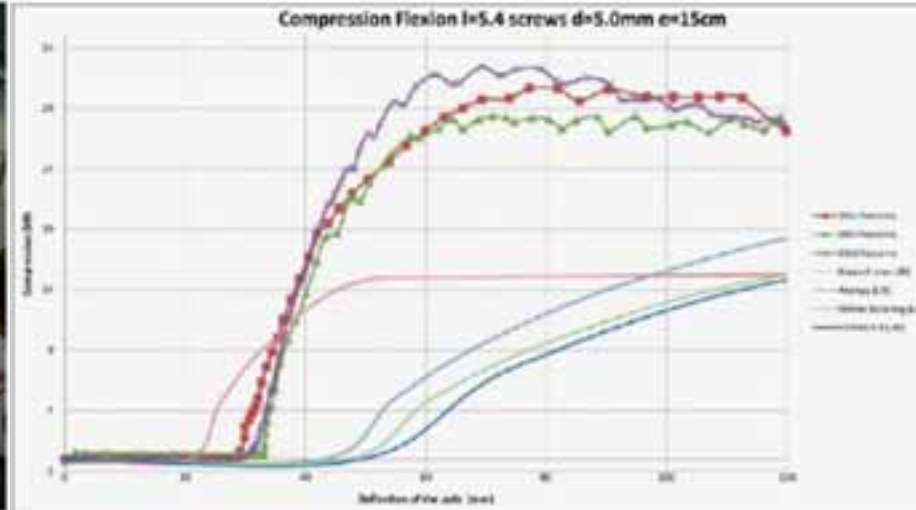


Figure 3 Kinematical relations for a multilayer beam with slips



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Prototype

Final validation of the finite element

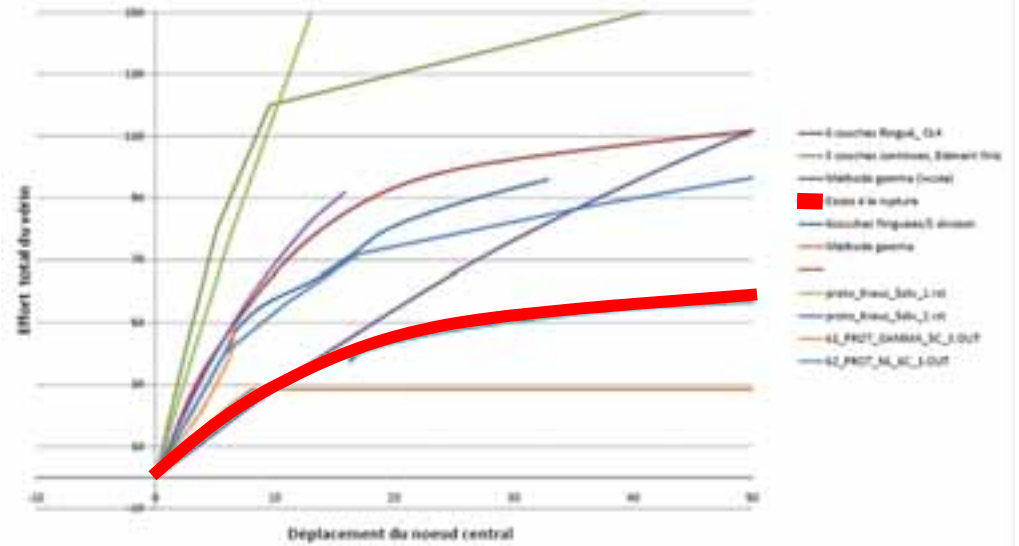
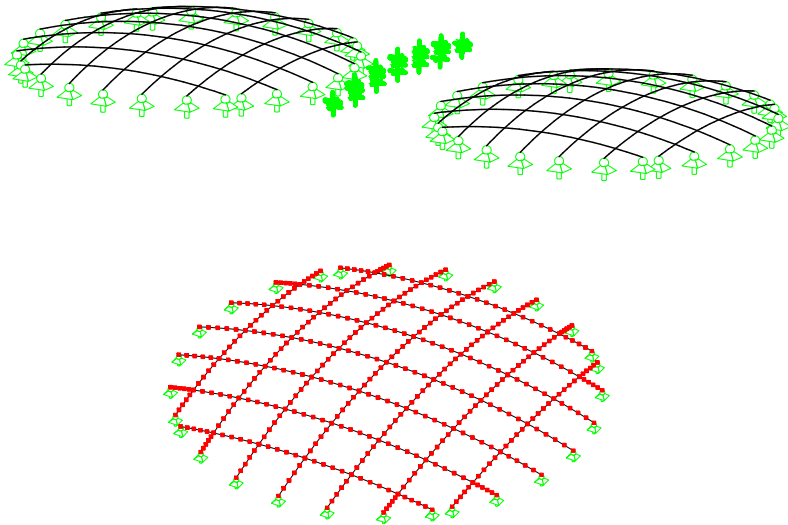


Johannes Natterer

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Modélisation du prototype

Résultats



Johannes Natterer

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Structural timber fabric

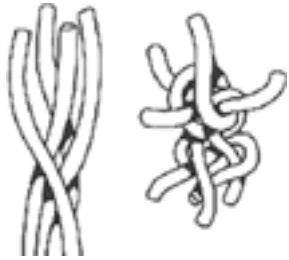
Applying textile principles to building scale



Markus Hudert

Innovative Timber Constructions
Yves Weinand

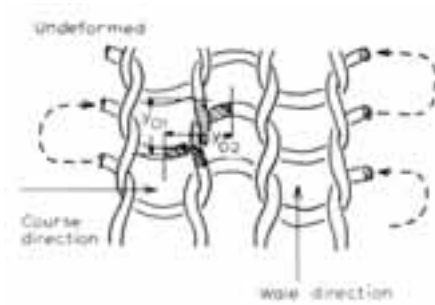
Felted Fibers



Example Exemple
.Felt *Feutre*
.Paper *Papier*

Interworked Elements

Primary Textile Techniques



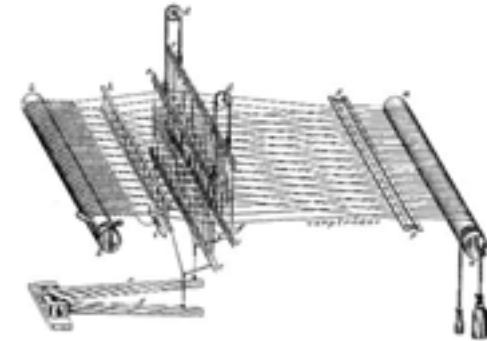
Example Exemple
.Mesh Fabrics *Tissus à mailles*

Transitional Techniques



Example Exemple
.Braiding *Tresser*
.Plaiting with active systems
natter avec systems active

Advanced Textile Techniques

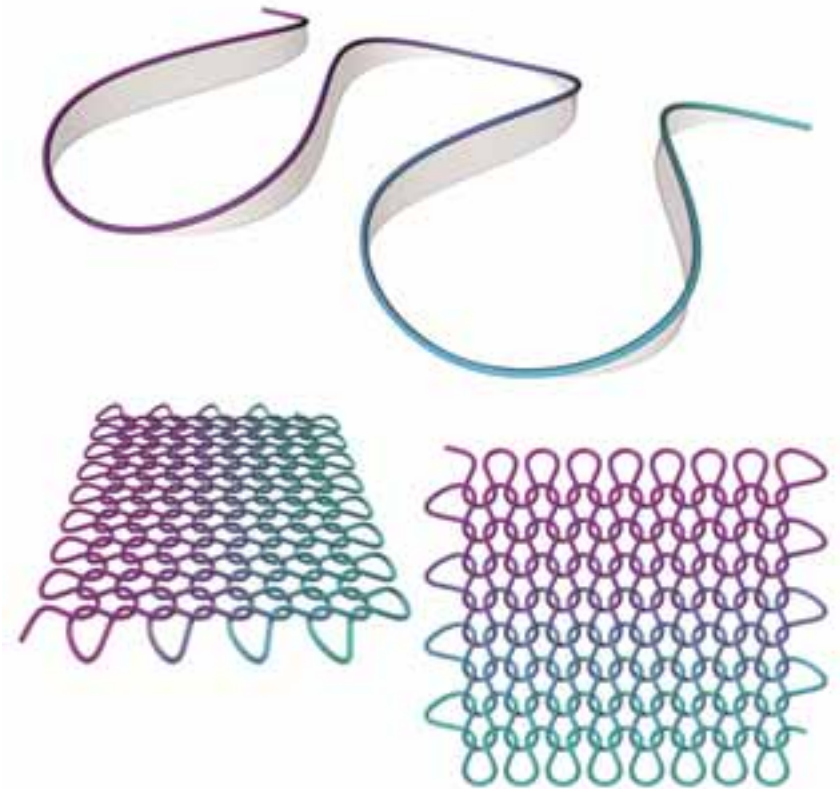
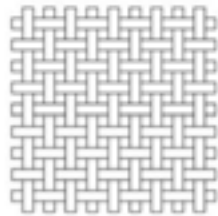


Example Exemple
.Weaving *Tisser*

Markus Hudert

Basic Textile Techniques

Felting, meshing, plaiting, weaving

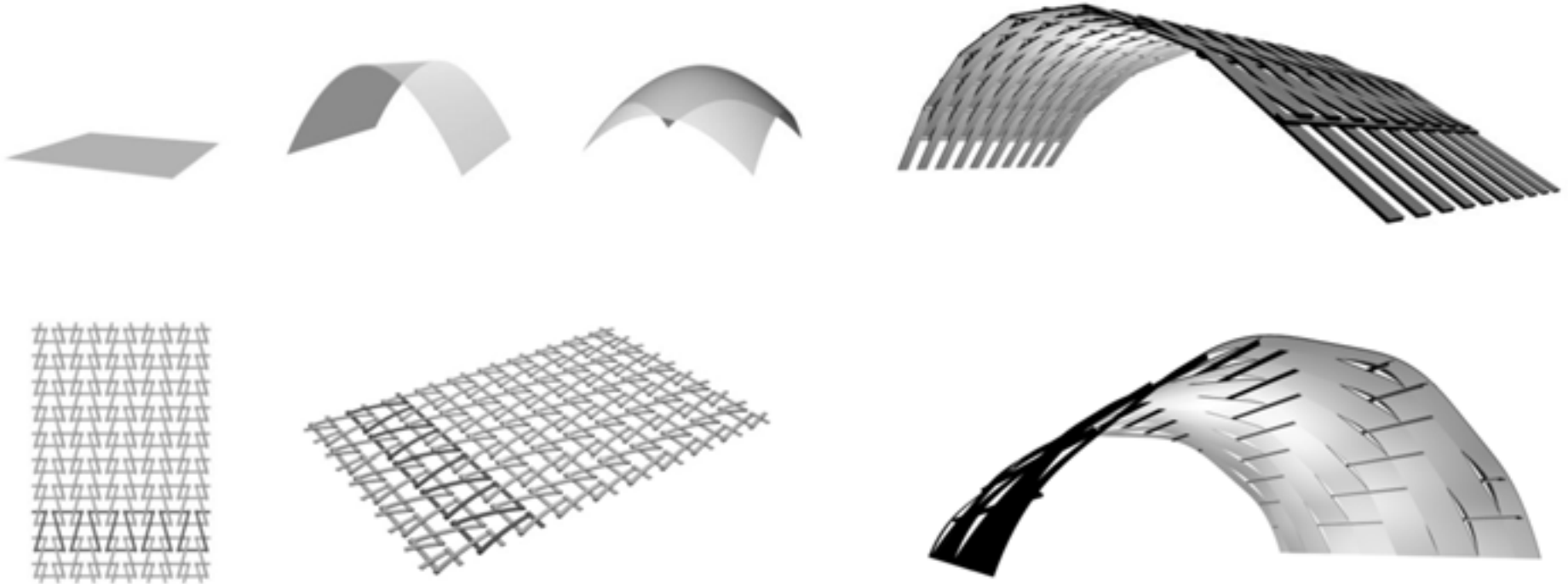


Markus Hudert

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Yves Weinand

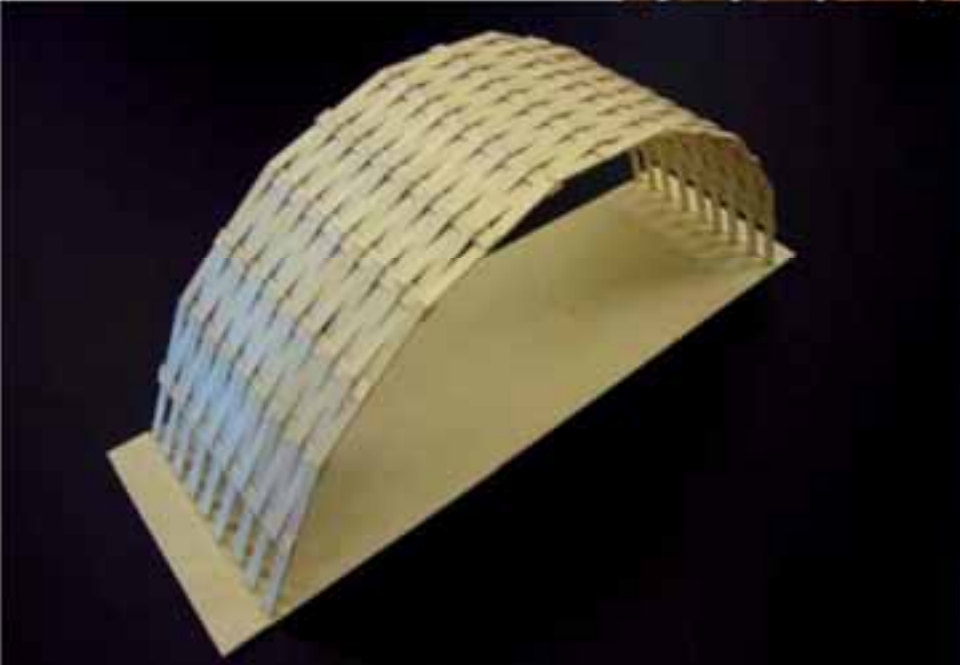
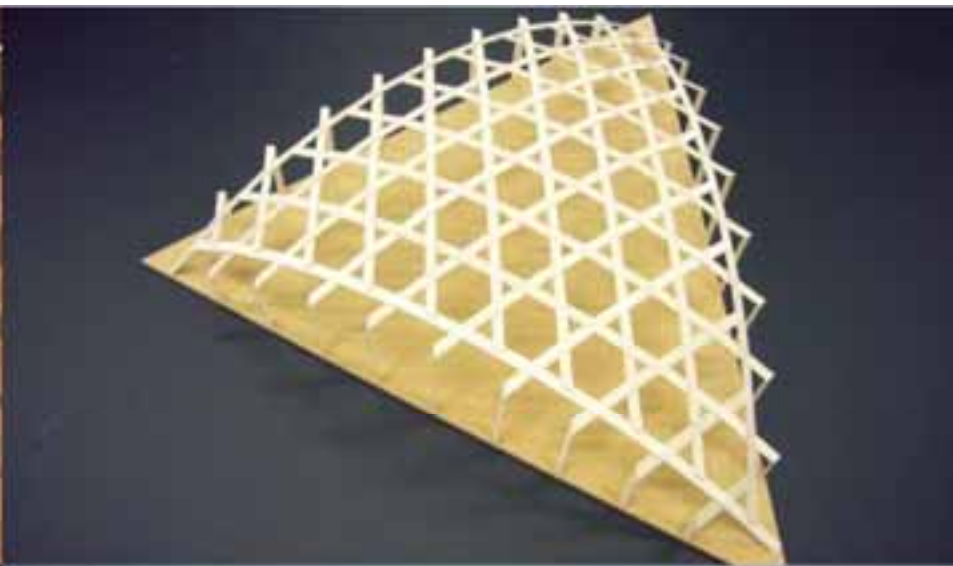
A matter of scale

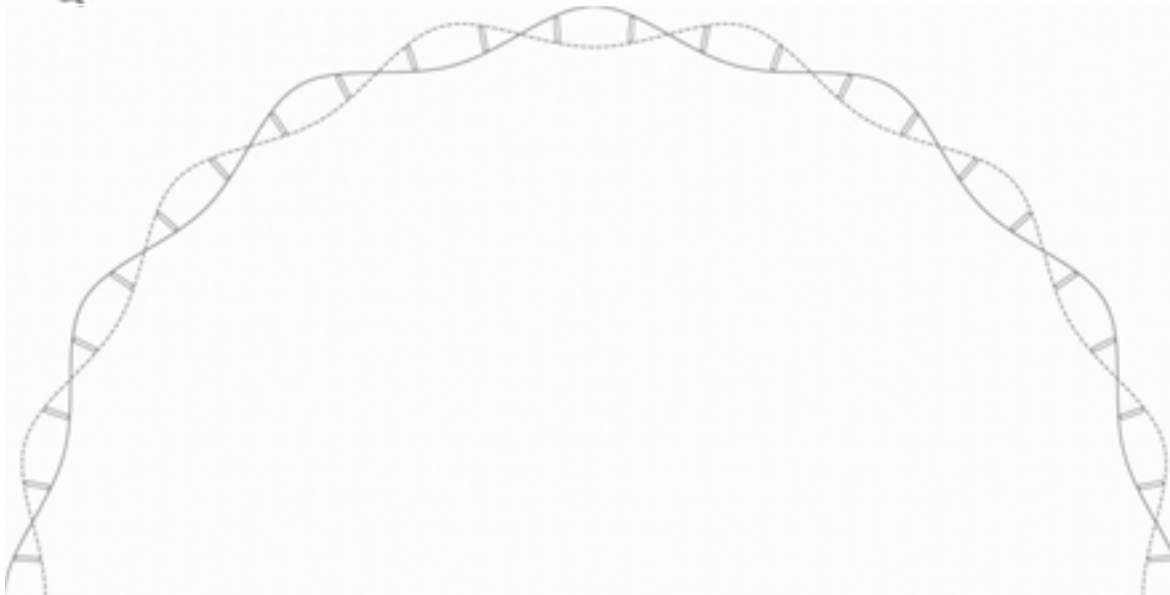
Changes in material, geometry and behaviour



Markus Hudert

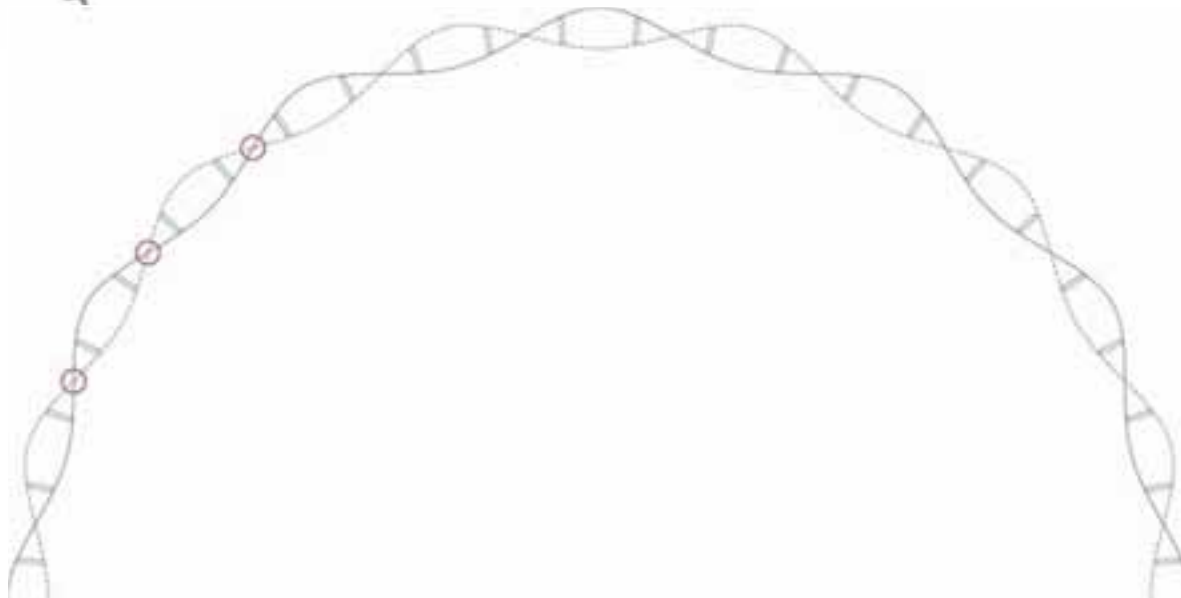
Innovative Timber Constructions
Yves Weinand





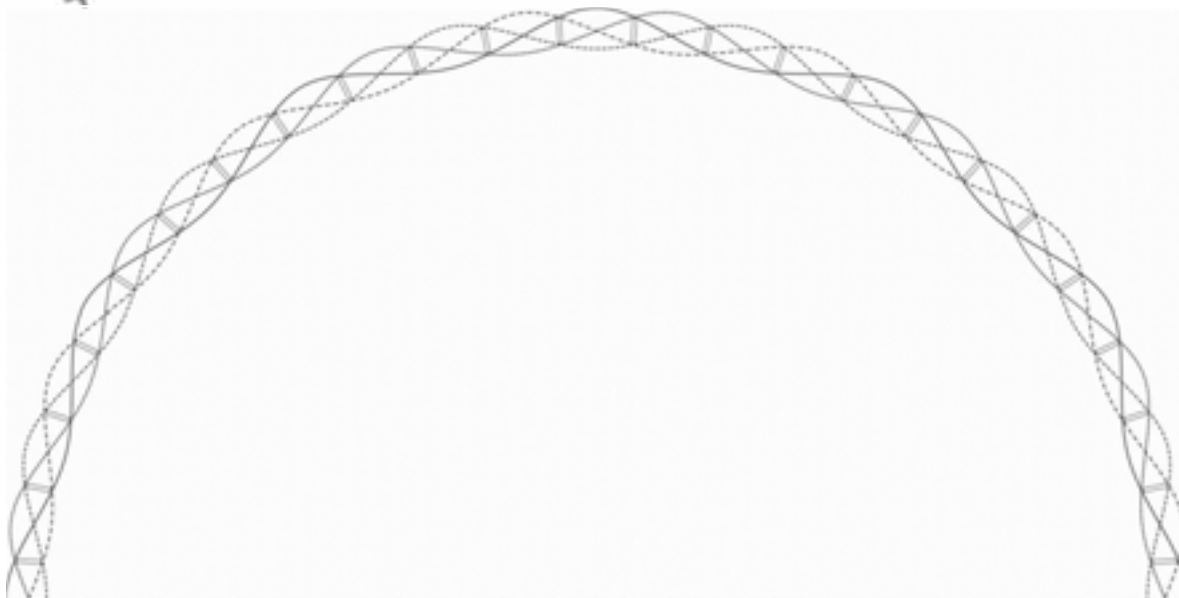
Markus Hudert

Innovative Timber Constructions
Yves Weinand



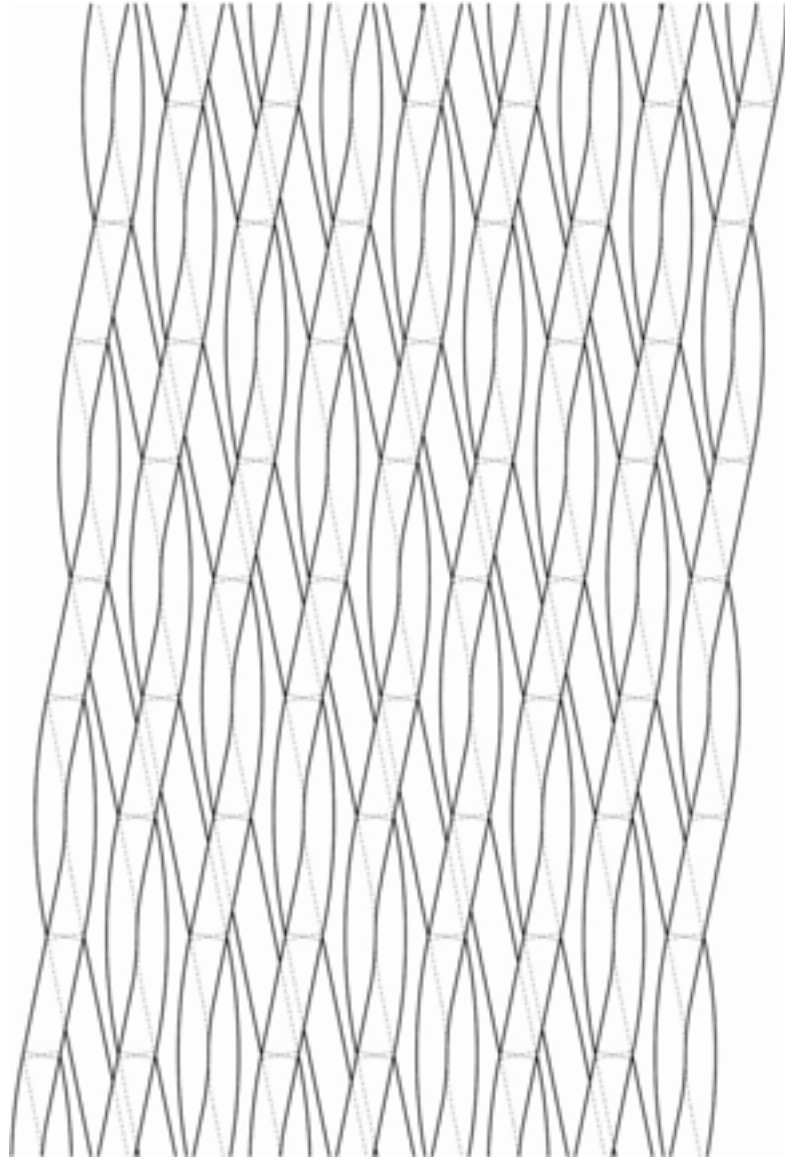
Markus Hudert

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Yves Weinand



Markus Hudert

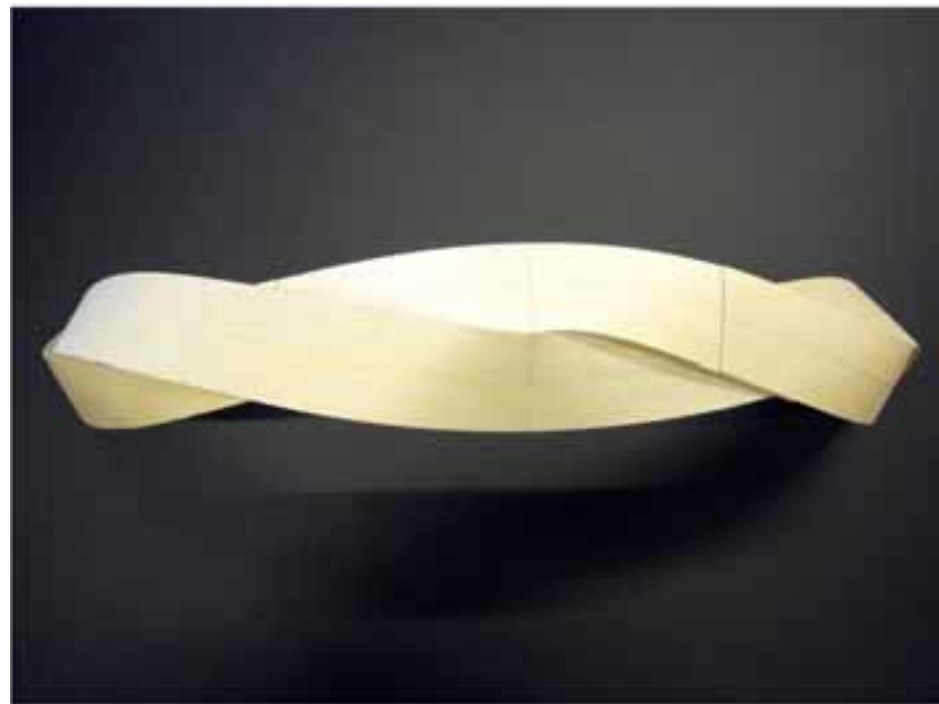
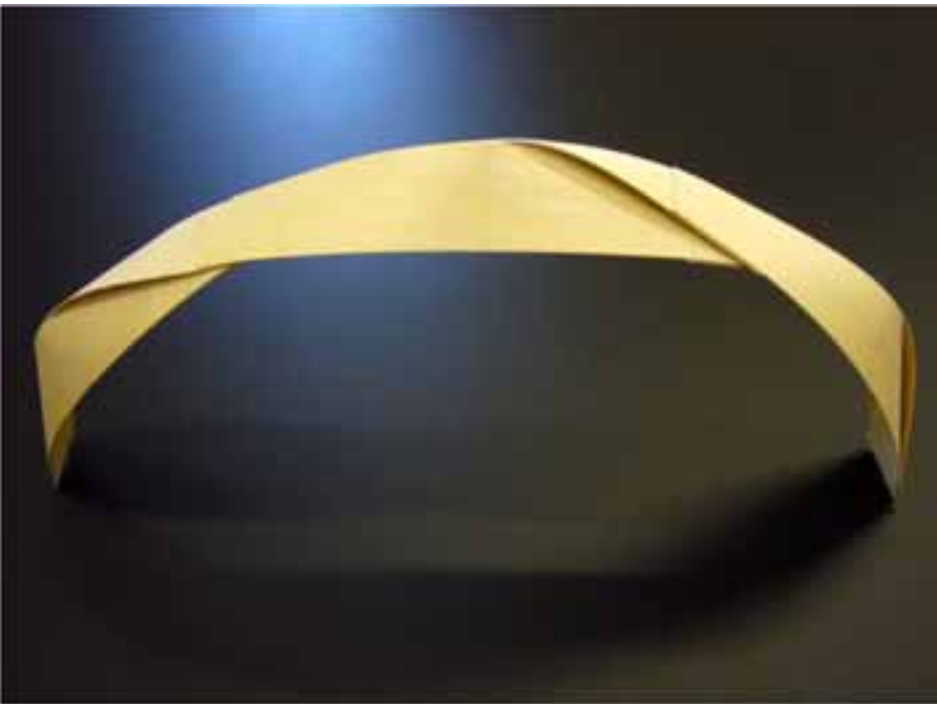
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„Sprang“ Structure

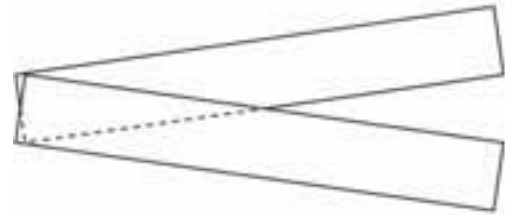
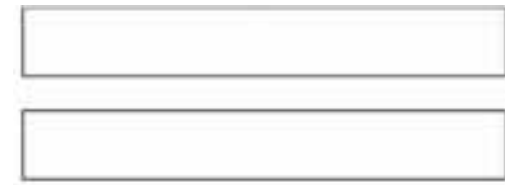
Markus Hudert

Innovative Timber Constructions
Yves Weinand



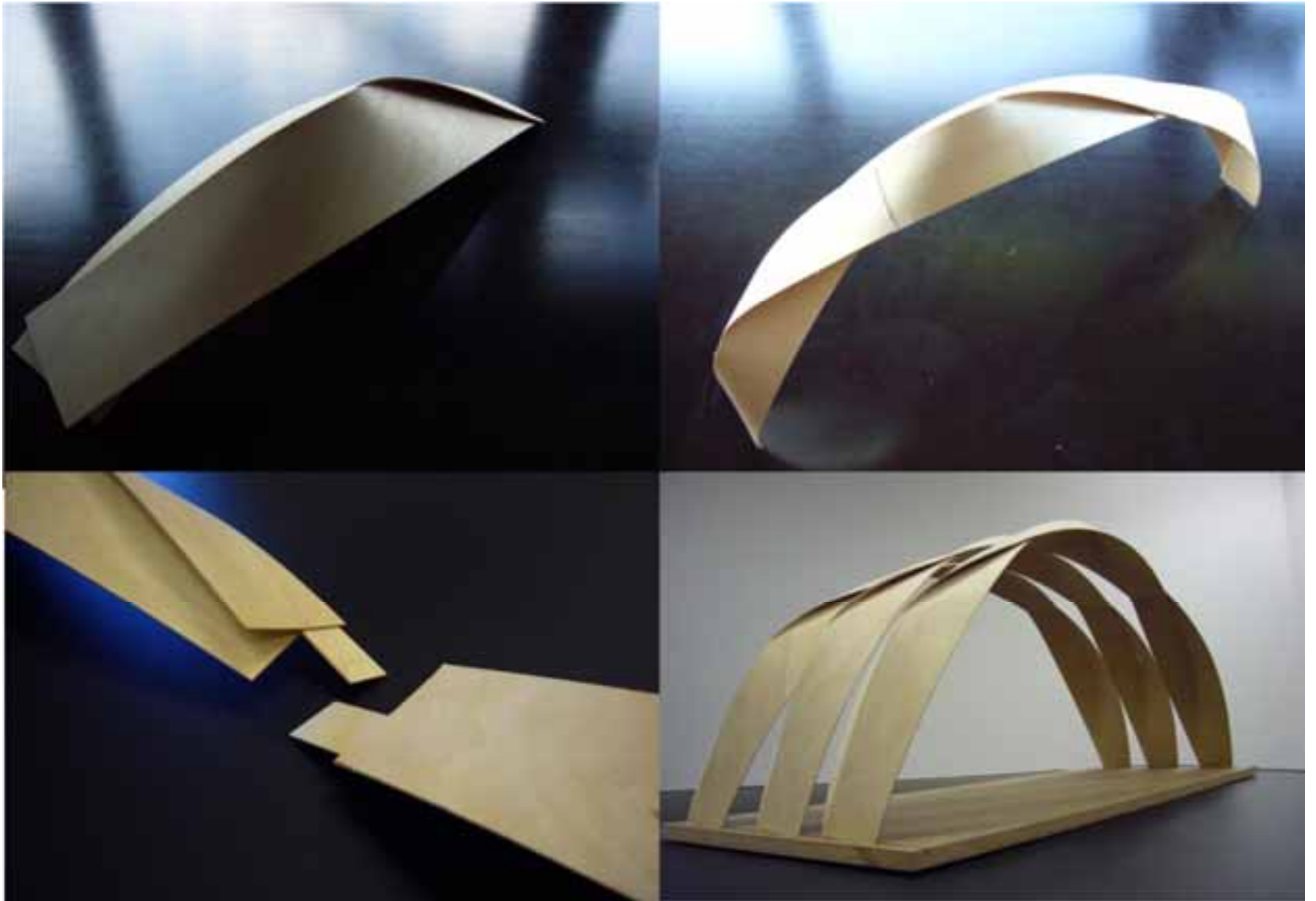
Markus Hudert, Masoud Sistaninia

Innovative Timber Constructions
Yves Weinand



Markus Hudert

Innovative Timber Constructions
Yves Weinand



Markus Hudert

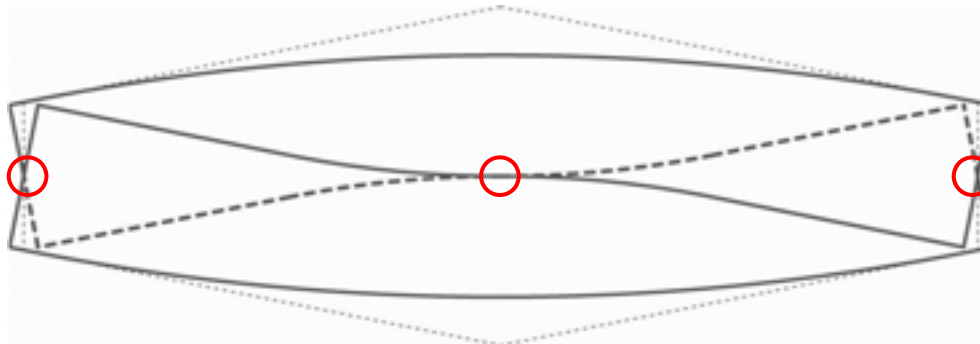
Innovative Timber Constructions
Yves Weinand



Markus Hudert

Innovative Timber Constructions
Yves Weinand

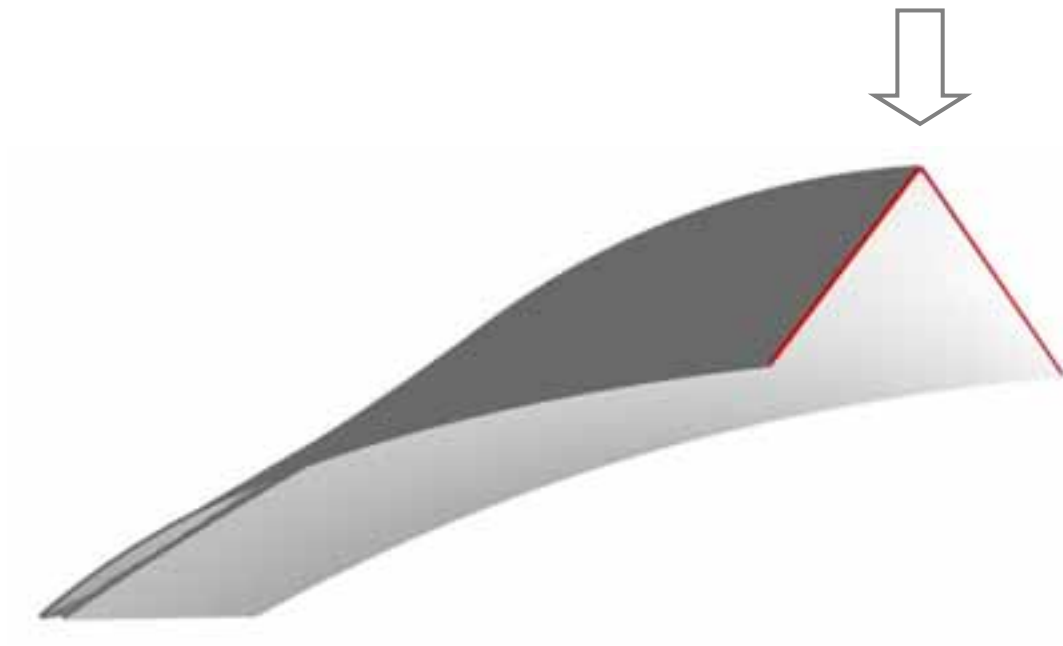




Fixpoints

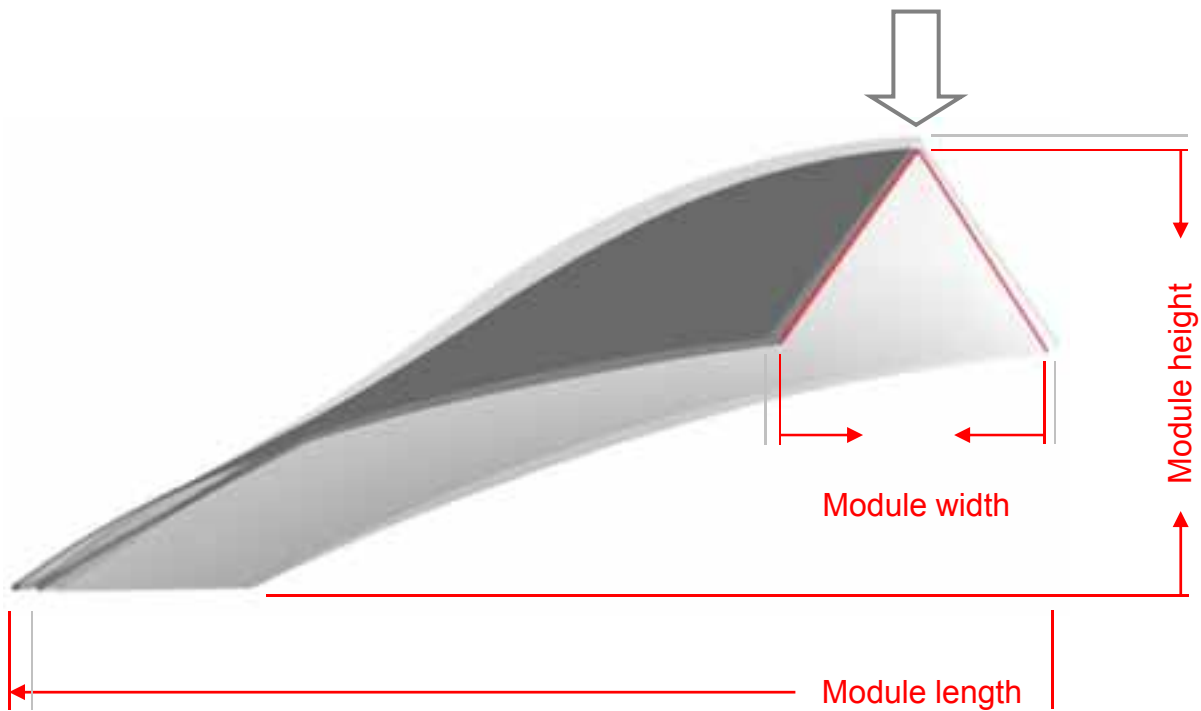
Markus Hudert, Masoud Sistaninia

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Yves Weinand

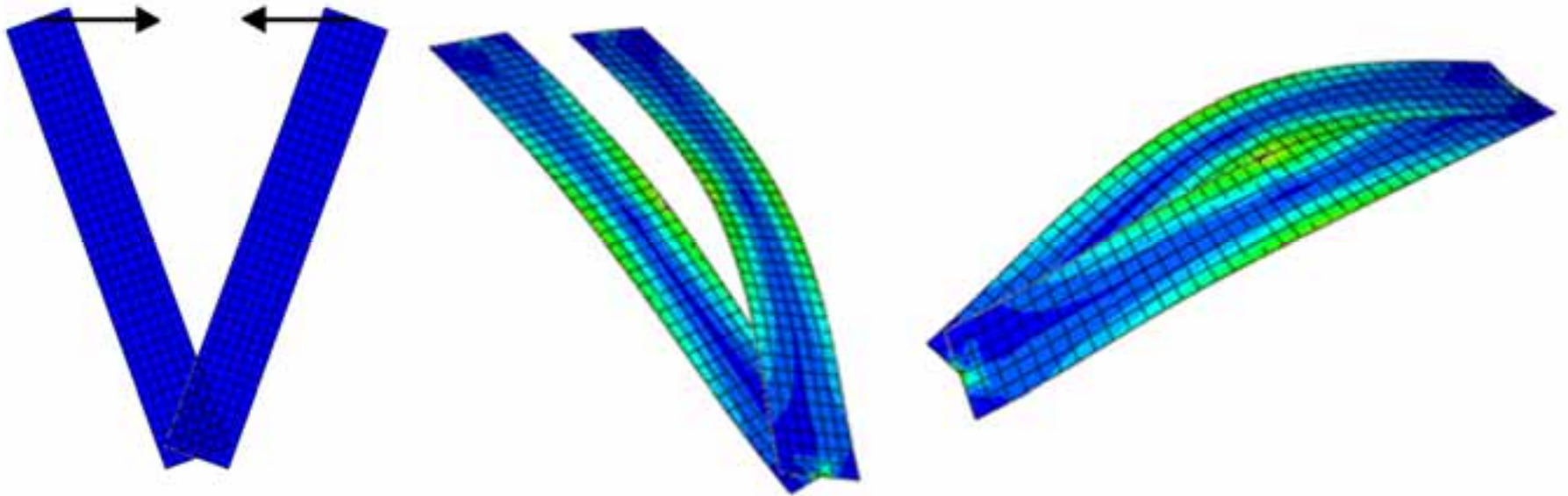


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Calculation of internal stresses in textile modulus

Finite Element software (ABAQUS 6.7-1) was used for this analysis

Simulated by FEM software:

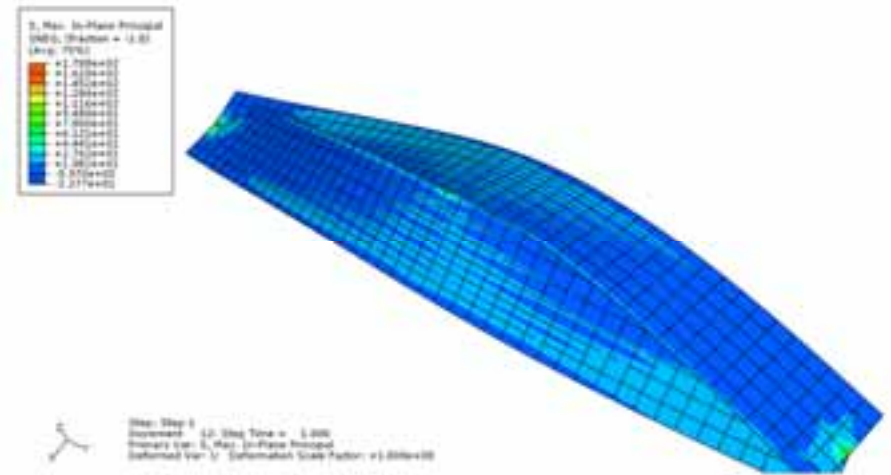
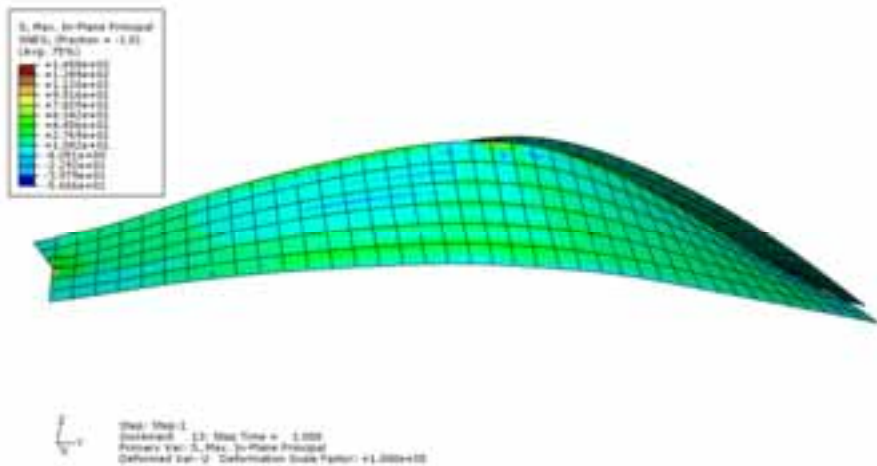


Masoud Sistaninia

Maximum principal internal stresses for two proportion

Proportion (length/width)= 7
Length= 11.55 m, Width= 1.65 m

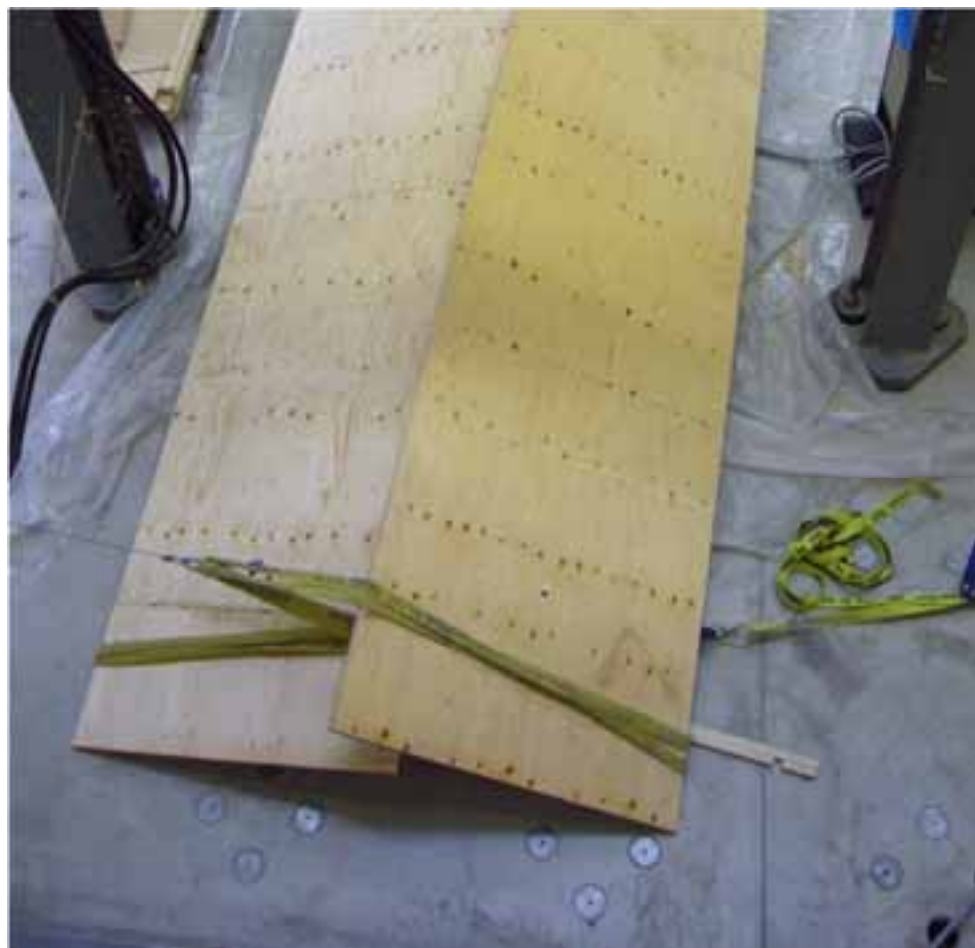
Proportion (length/width)= 8.7
Length= 11.55 m, Width= 1.32 m



Maximum Principal stress= 46 MPa

Maximum Principal stress= 29 MPa

Masoud Sistaninia



Markus Hudert

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Yves Weinand

Conclusion of this analysis

According to ABAQUS results, proportion ≥ 8.7 is safe for Plywood material with $E=8800$ Mpa, tensile strength= 26 MPa

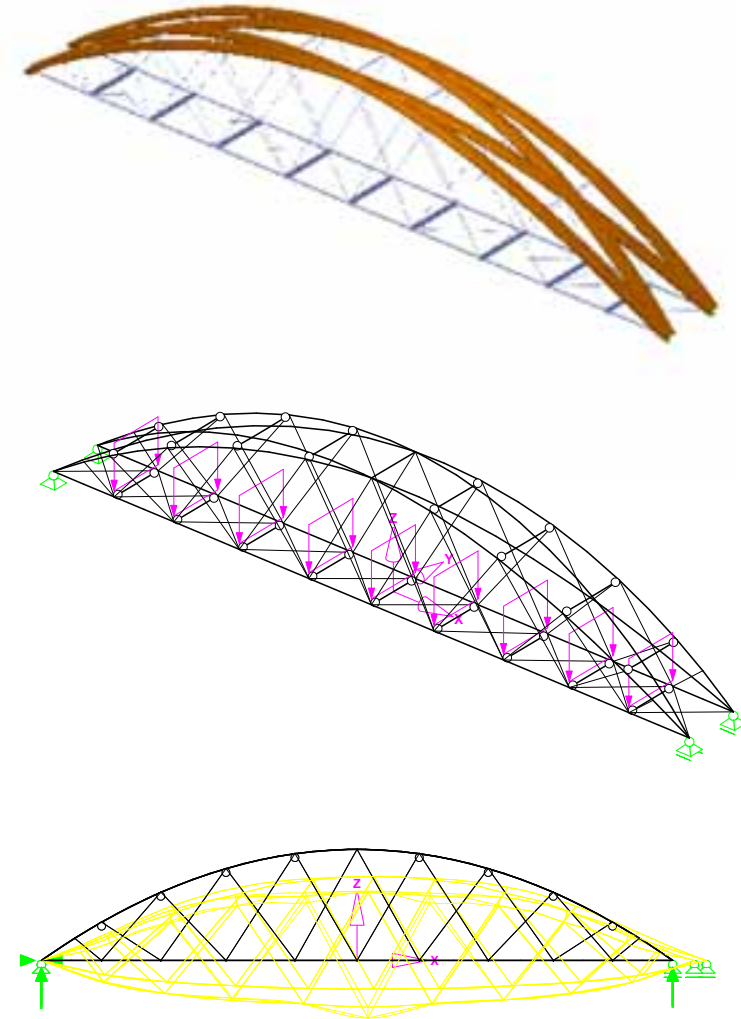
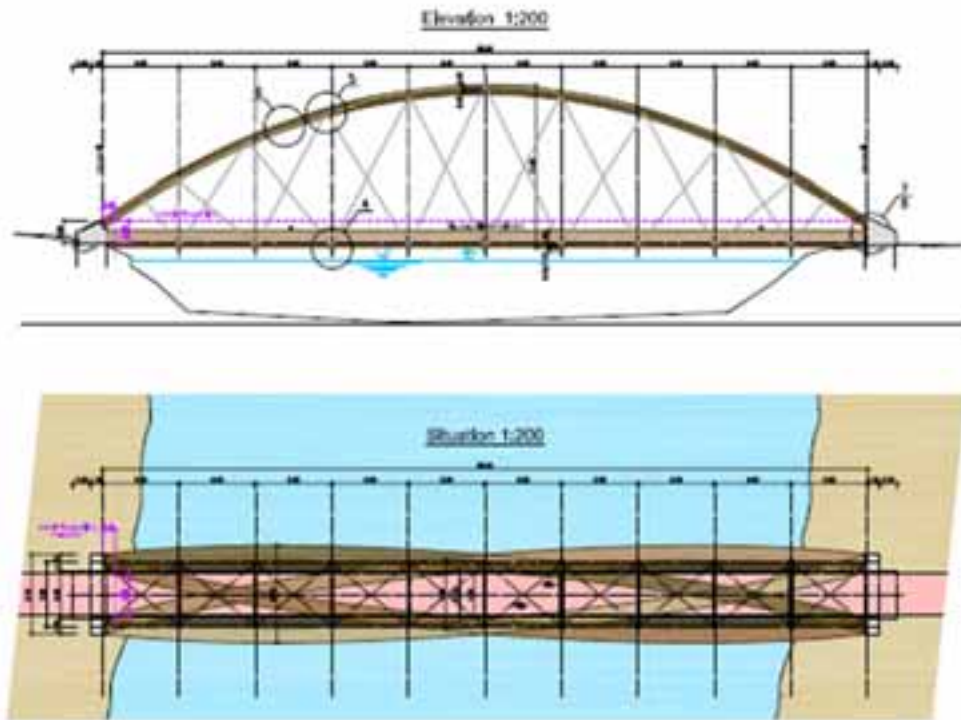
Prototype

The modulus with proportion of 8.7 was built in the laboratory

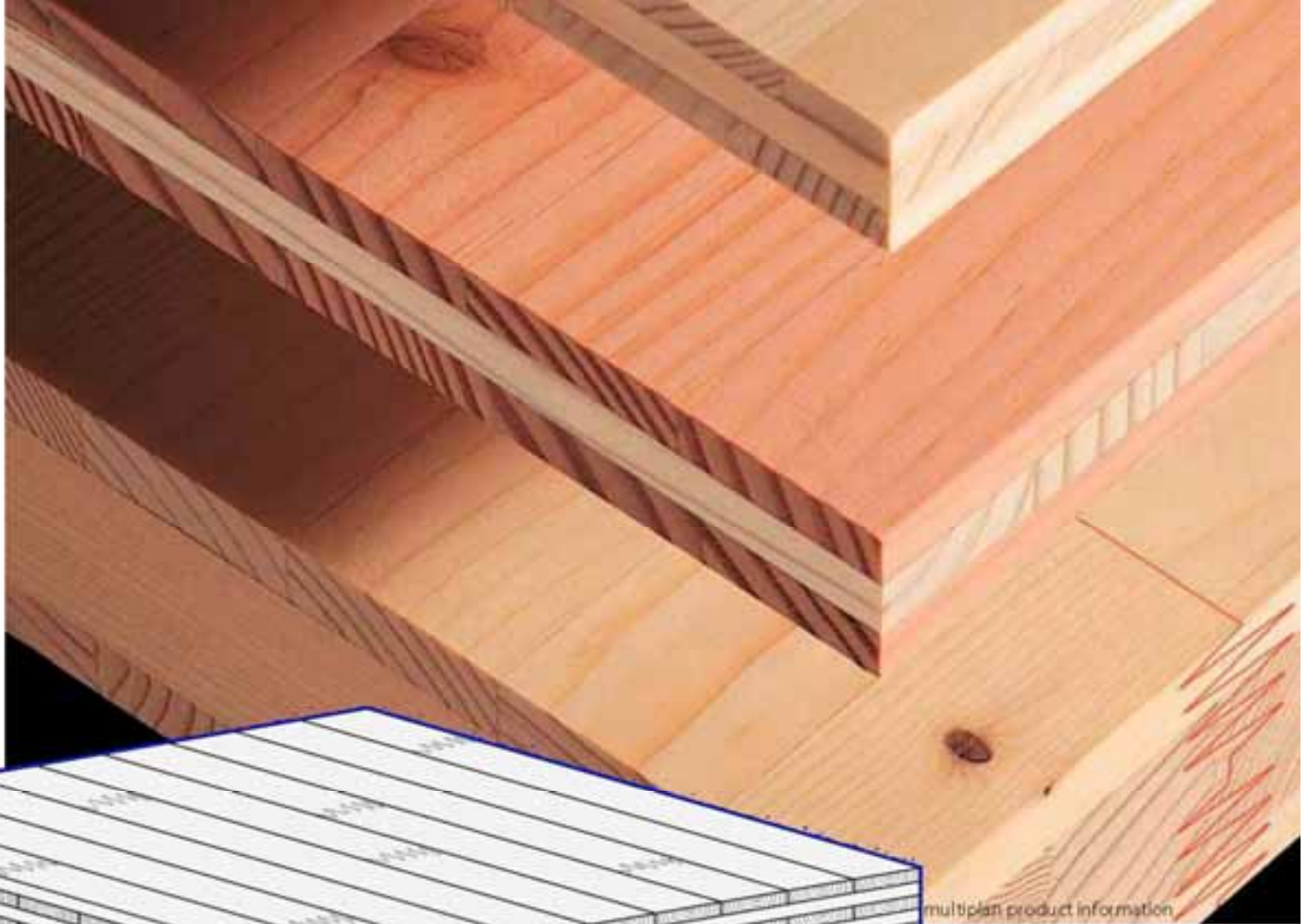


Masoud Sistaninia

Passerelle tressée



Student Richard Thürler

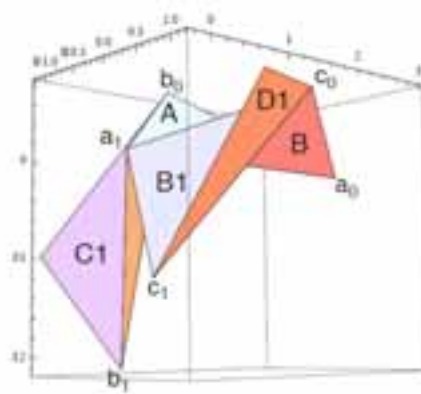




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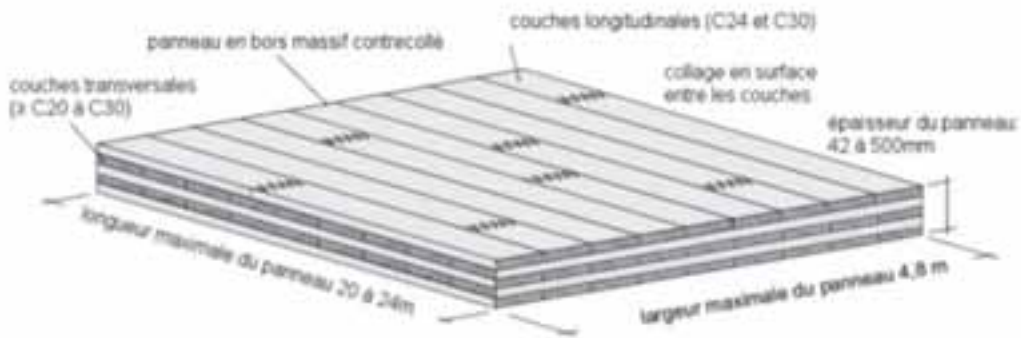
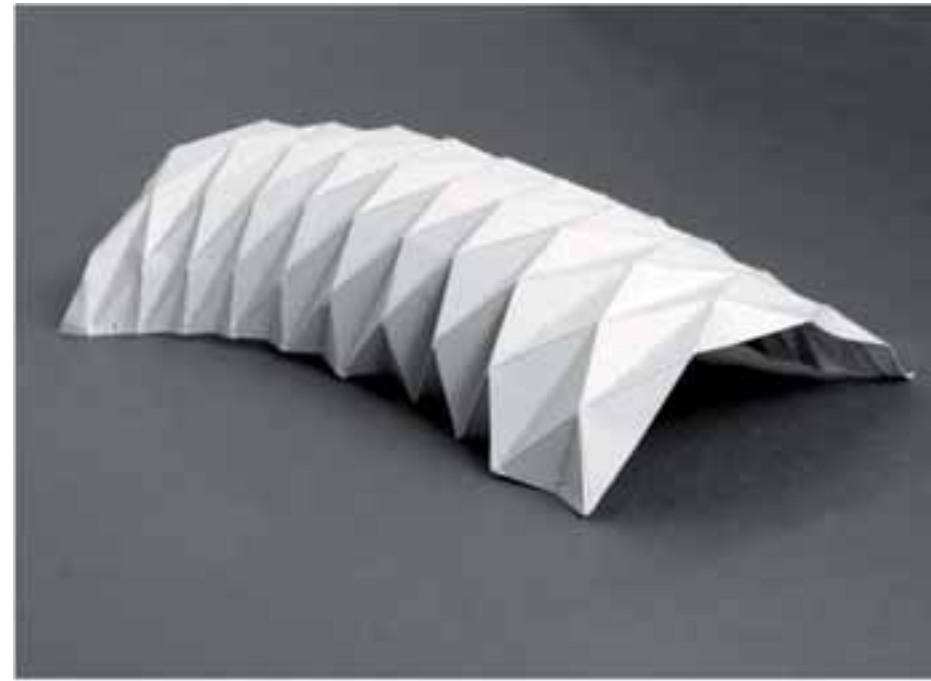
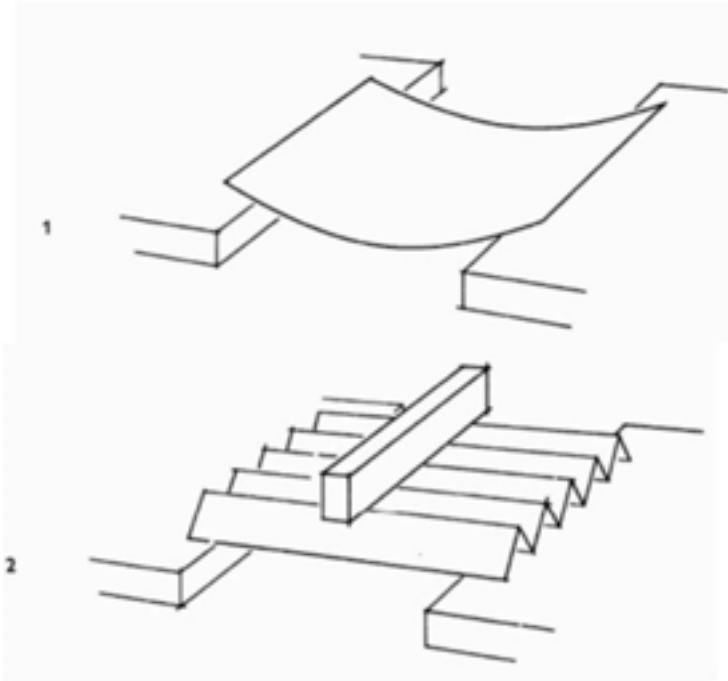
Origami – Folded Plate

An interdisciplinary reasearch between architects, engineers and mathematiciens



Hani Buri, François Demoures

Innovative Timber Constructions
Yves Weinand

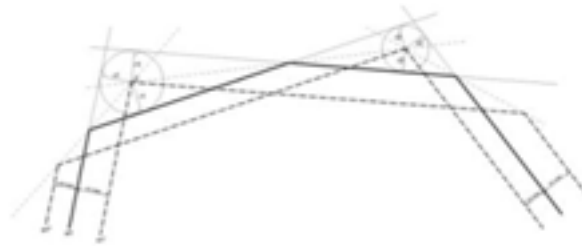


Hani Buri

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Yves Weinand

Method

- Form-finding
- Analysis of the geometry
- Prototypes

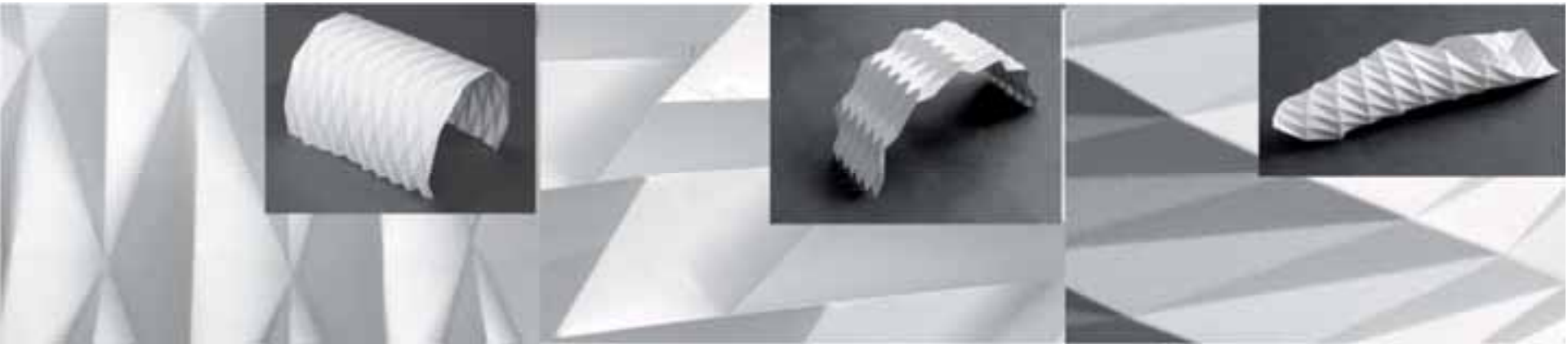


Hani Buri

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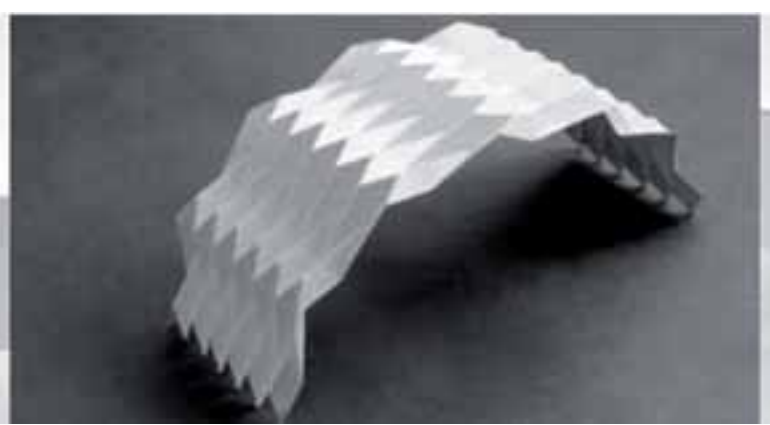
Patterns

- Diamond
- Herrigbone
- Diagonal



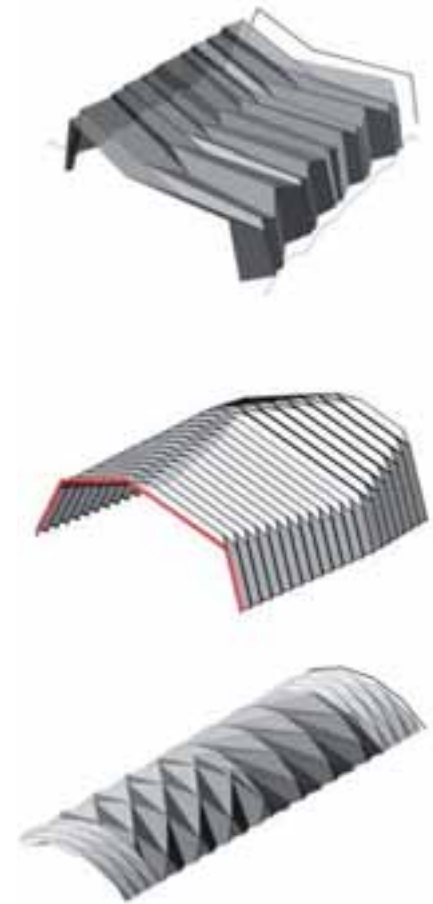
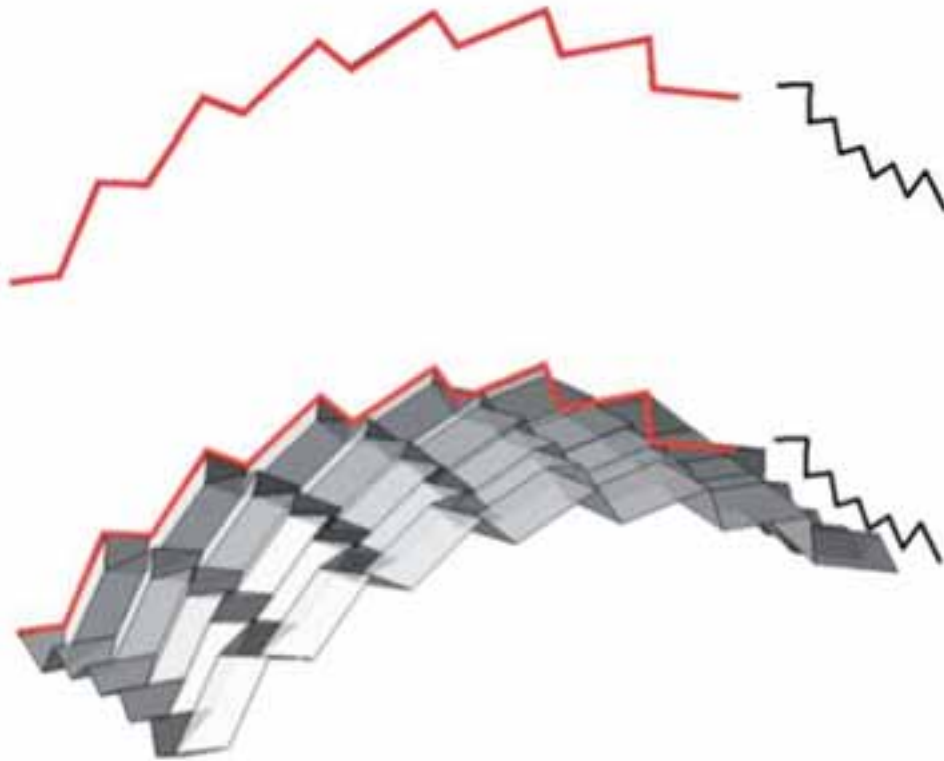
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Numerical pattern generation

Two profiles generate a folding pattern



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Prototype



Hani Buri

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Yves Weinand

Origami, engineering

Goal

Provide tools that allow an economic and easy realisation of folded constructions made from cross glued timber panels

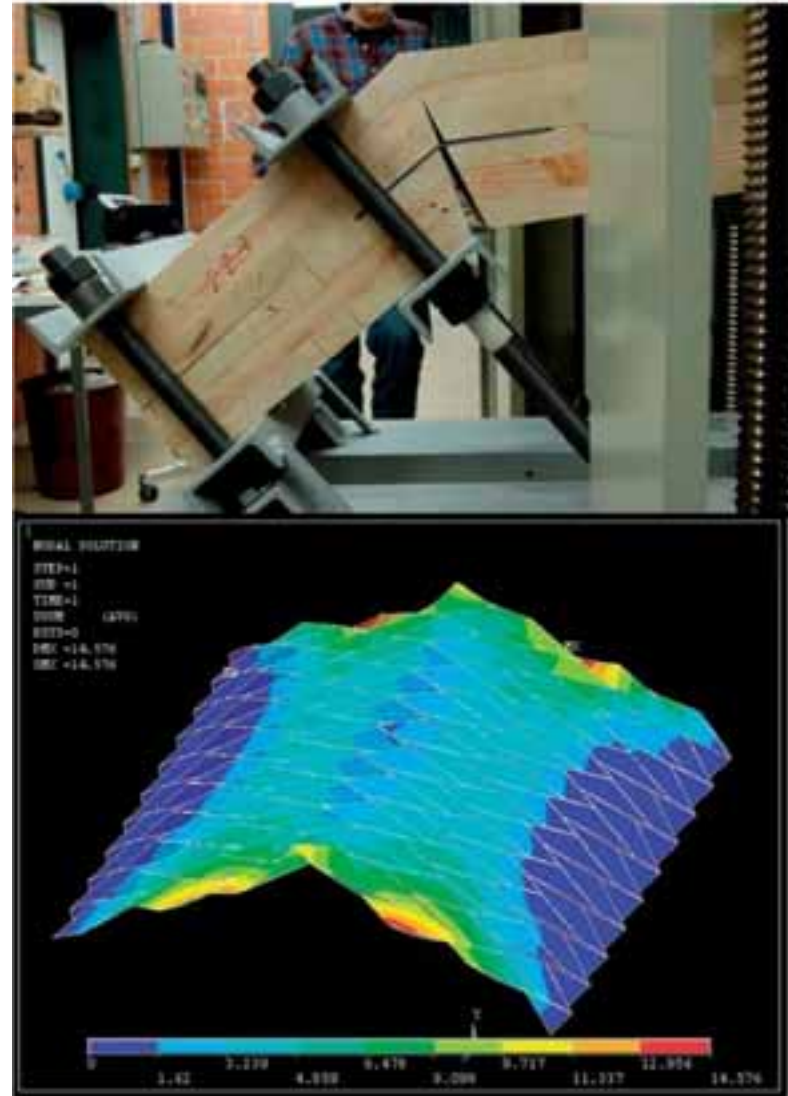


Hani Buri

Innovative Timber Constructions
Yves Weinand

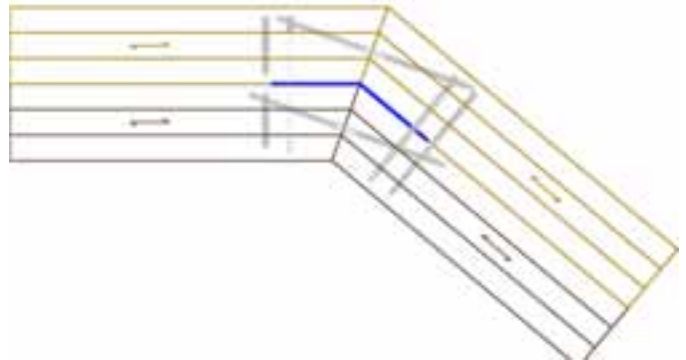
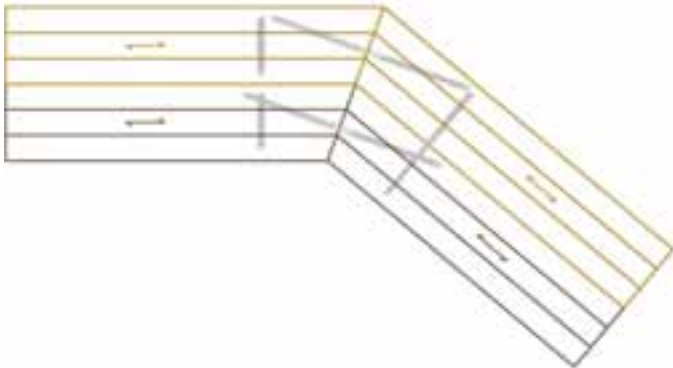
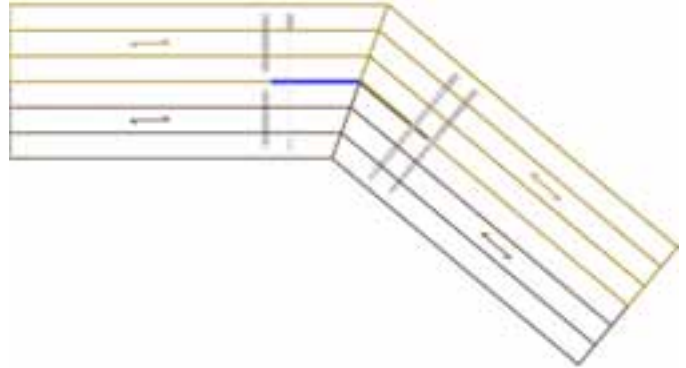
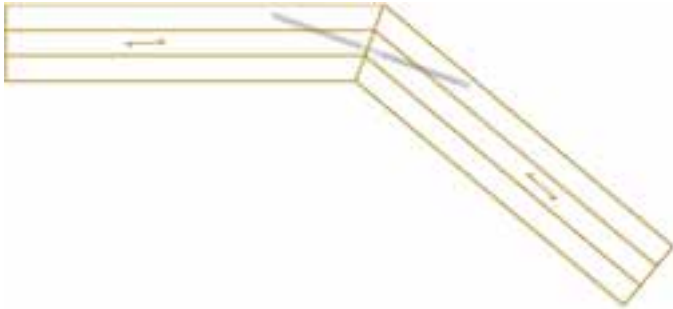
Methods

Both numerical simulation and laboratory testing contribute important information

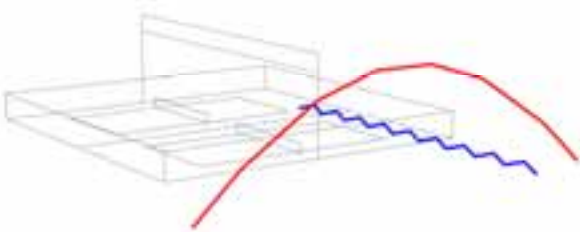
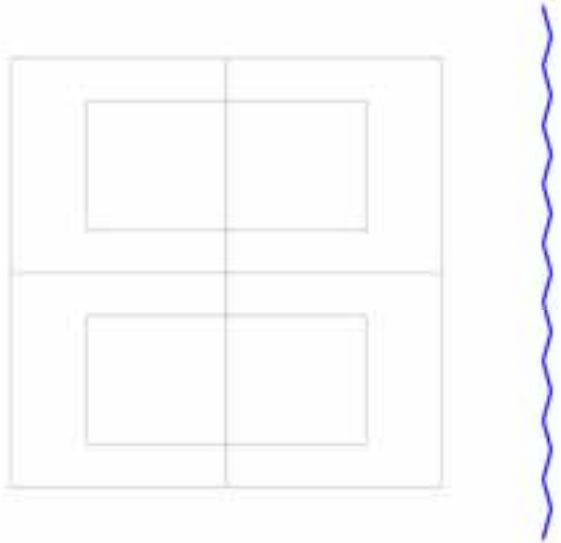


Hani Buri

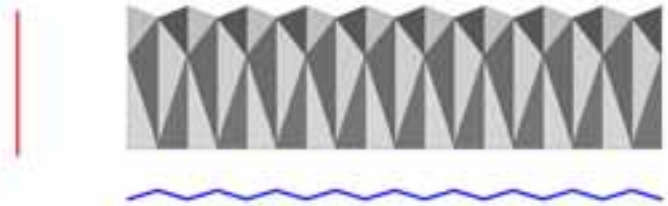
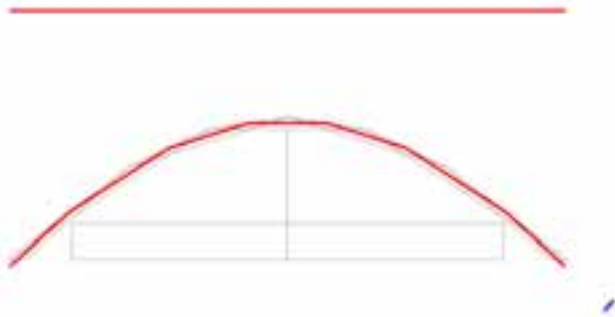
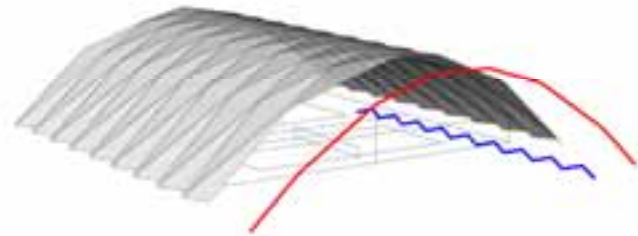
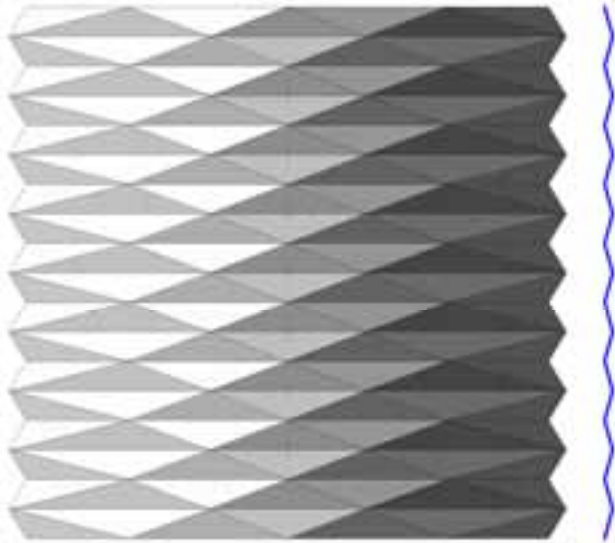
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Yves Weinand



Hani Buri

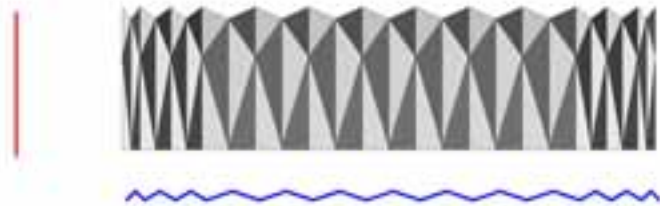
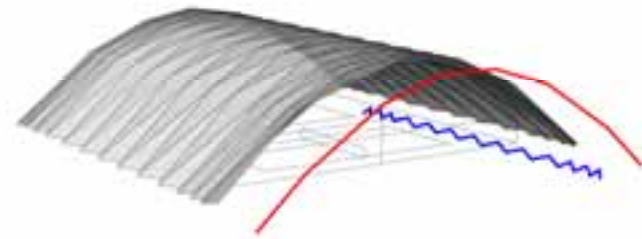
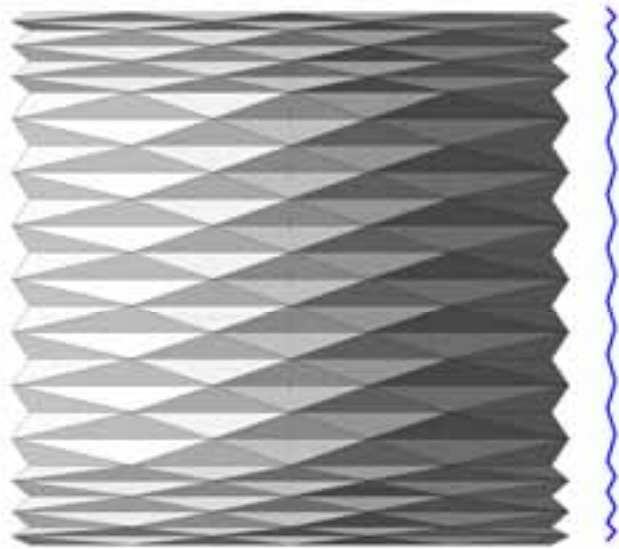


Hani Buri



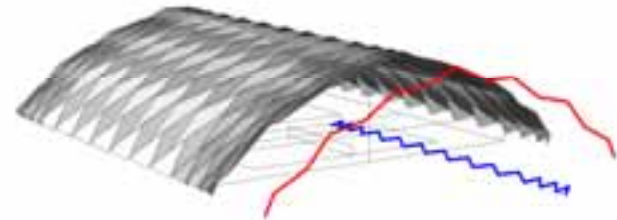
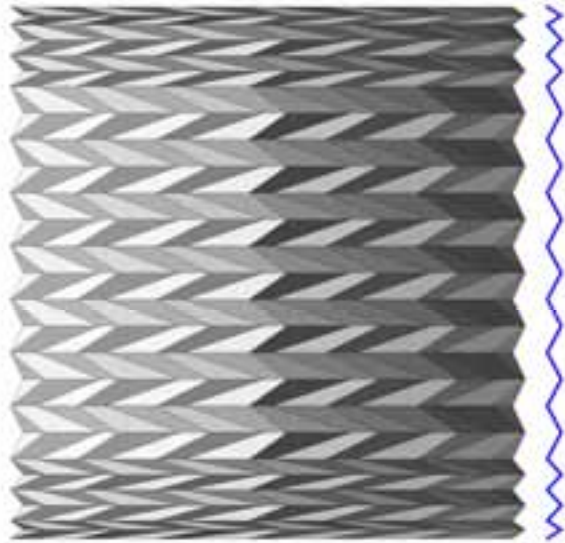
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Yves Weinand



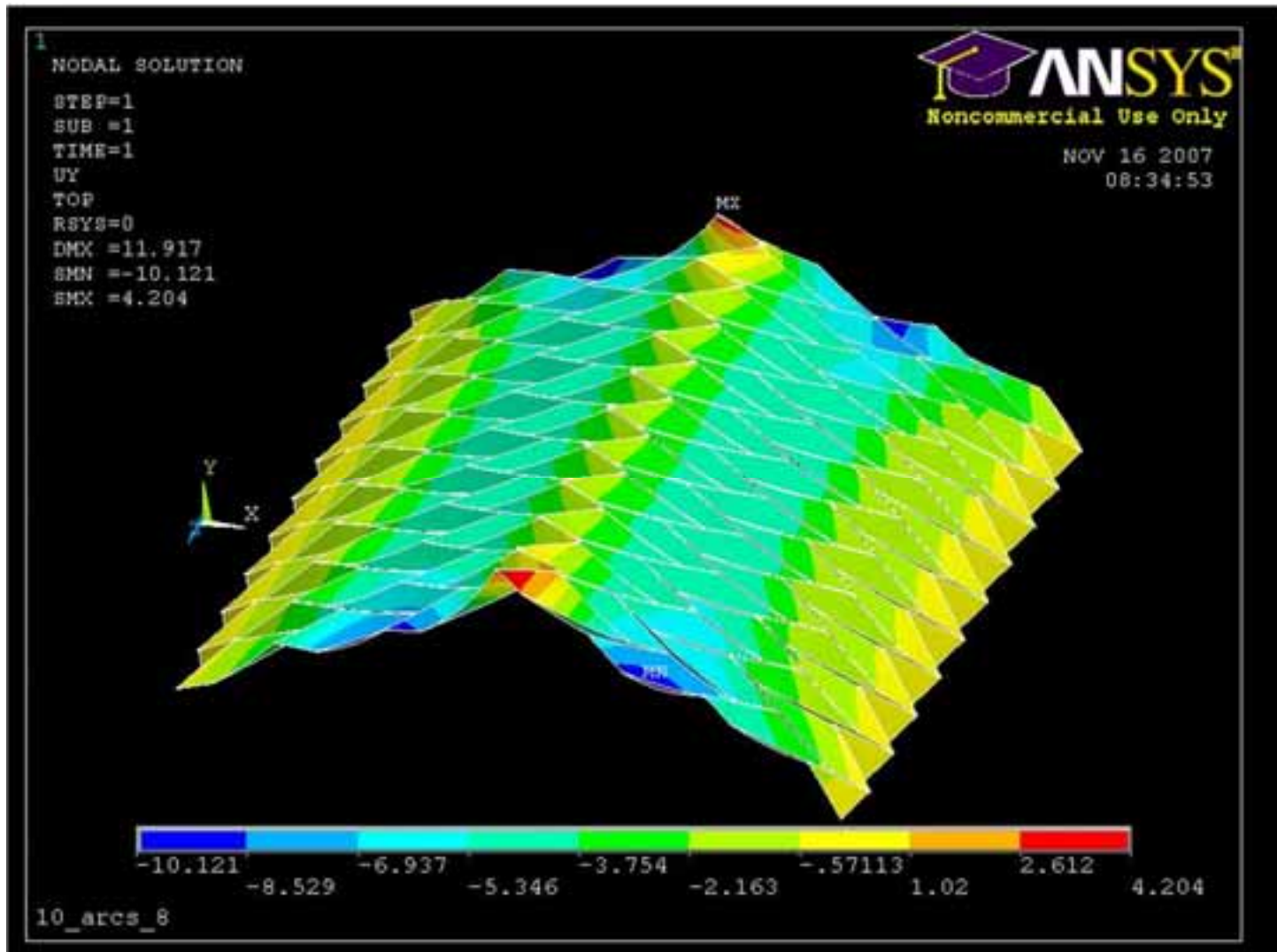
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Yves Weinand



Hani Buri

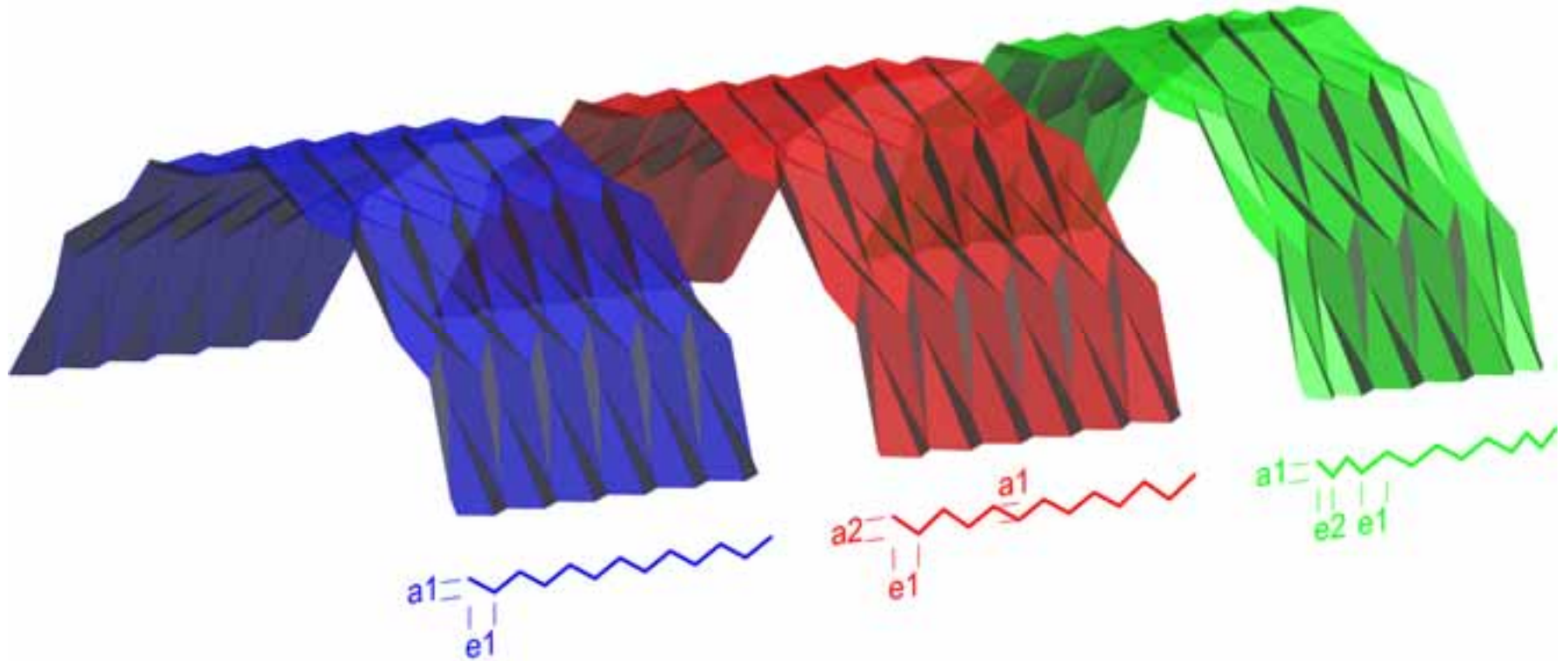
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 Yves Weinand

Variations of amplitude and extension of a folded plate structure:



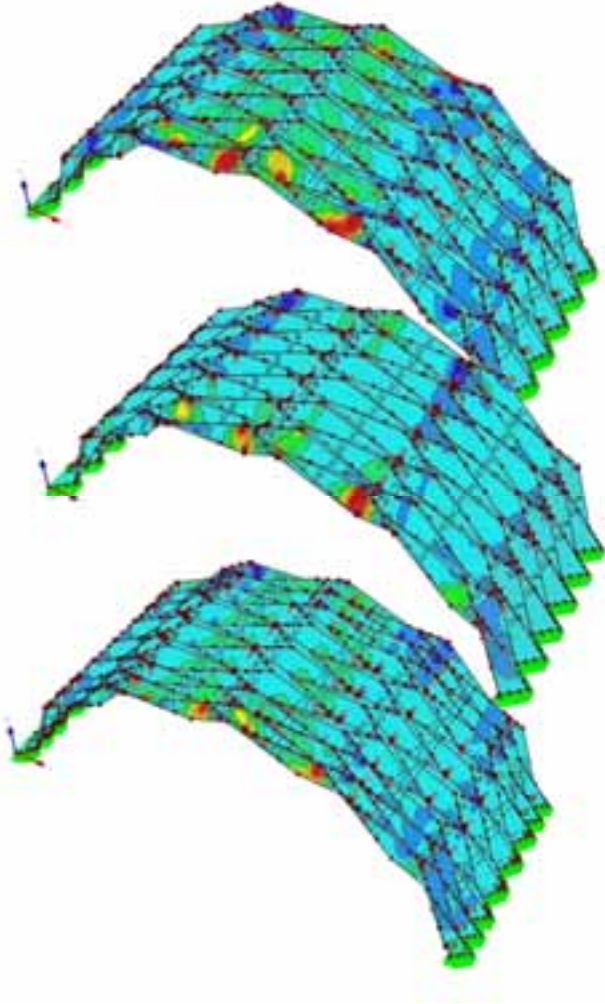
1. amplitude $a1$ constant
extension $e1$ constant

2. amplitude $a2 > a1$
extension $e1$ constant

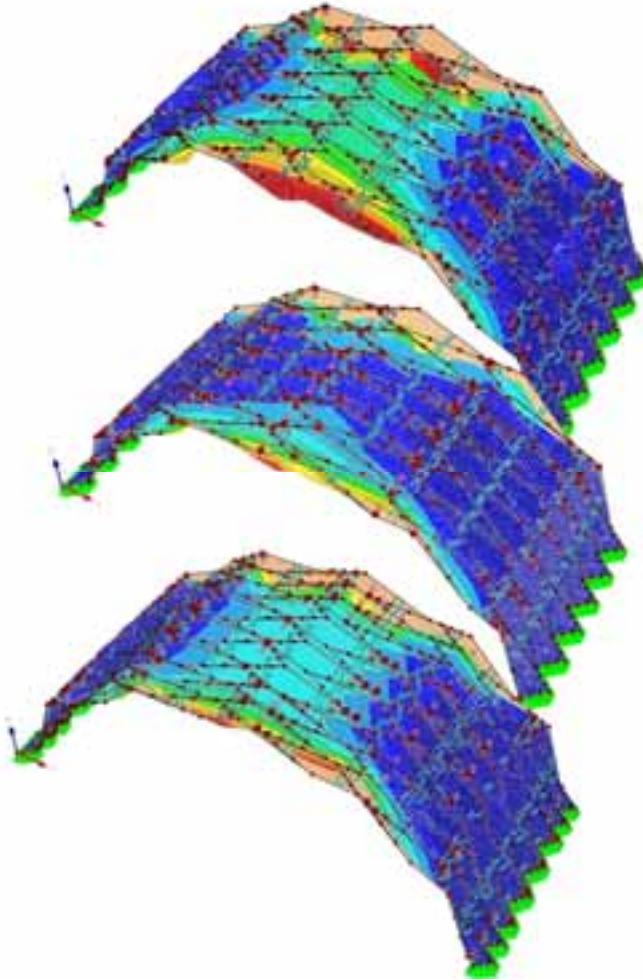
3. amplitude $a1$ constant
extension $e2 < e1$

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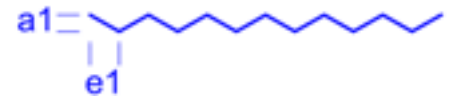
Internal forces



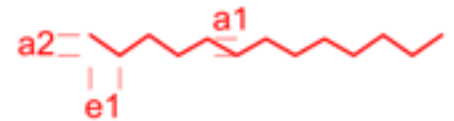
Deformations



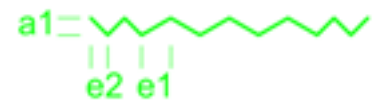
1. Max vectorial displacement 3.3 mm



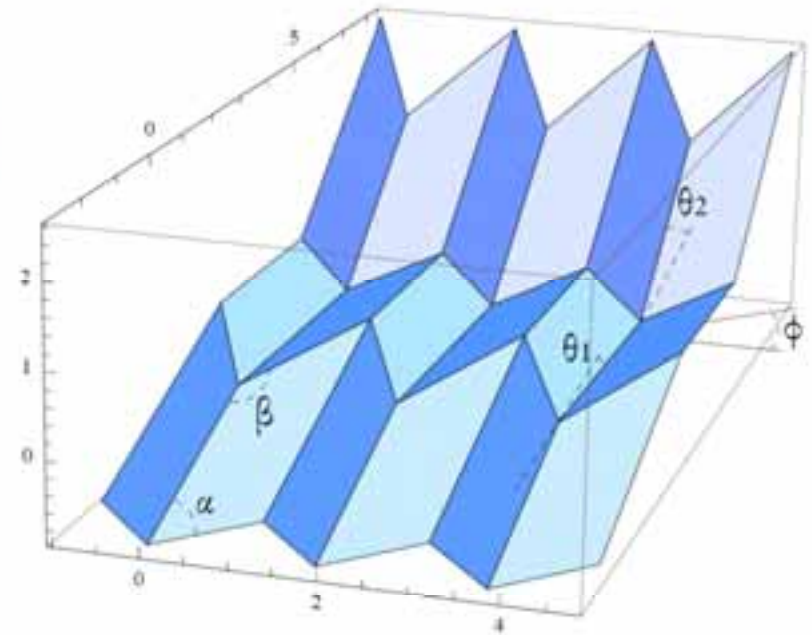
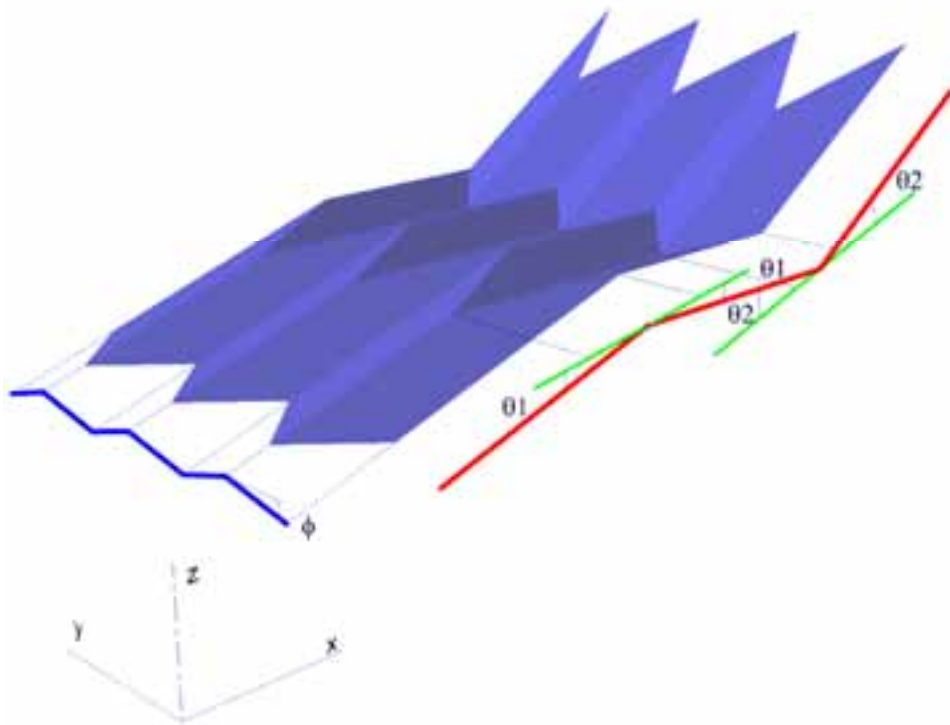
2. Max vectorial displacement 2.2 mm



3. Max vectorial displacement 1.9 mm



Hani Buri, Johannes Natterer



$$\theta_1 = \text{ArcTan}(\text{Sin}(\phi) \text{Tan}(\alpha))$$

$$\theta_2 = \text{ArcTan}(\text{Sin}(\phi) \text{Tan}(\beta))$$

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IFS surface design for timber constructions

An interdisciplinary research between architects,
mathematicians and computer scientists

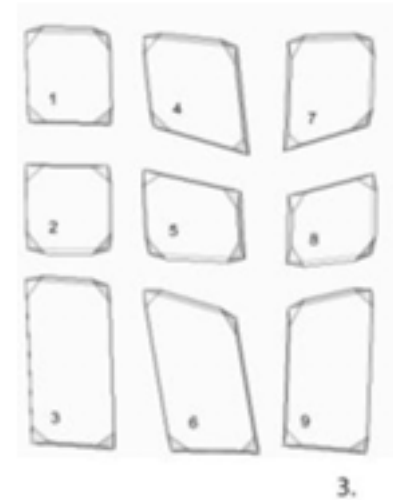
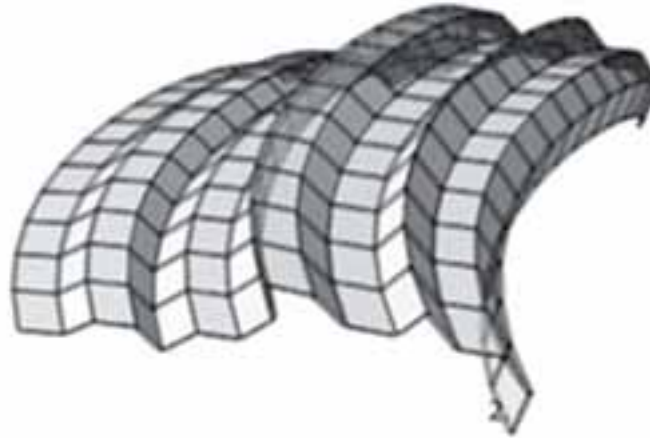
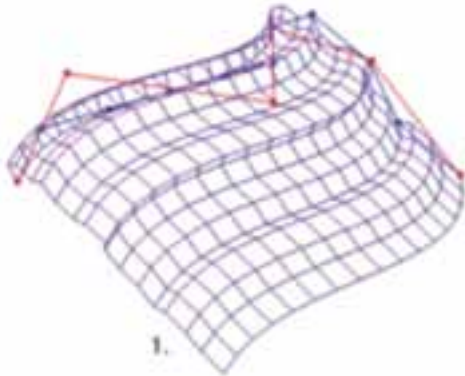


Gilles Gouaty, Ivo Stotz

Innovative Timber Constructions
Yves Weinand

Goal

Computer-aided solutions for the production of complex free-form architecture



```
%prog2
N1 G90
N2 G71 T1 R6
N3 G0 X93.0203260604704 Y62.5742002389265
N4 G1 Z-3
N5 G1 X92.5173637881376 Y32.3964638989584
N6 G1 Z6
N7 G0 X108.361877416248 Y60.3013778158484
N8 G1 Z-3
N9 G1 X107.858915143915 Y30.1236414758803
N10 G1 Z6
N11 G0 X96.8557138994148 Y62.005994633157
N12 G1 Z-3
N13 G1 X96.352751627082 Y31.8282582931889
N14 G1 Z6
N15 G0 X104.526489577304 Y60.8695834216179
N16 G1 Z-3
N17 G1 X104.023527304971 Y30.6918470816498
N18 G1 Z6
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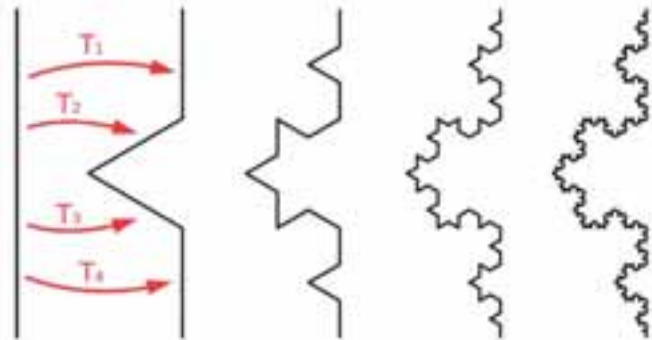
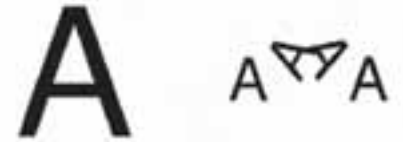
Digital production of free-form architecture

1. Free Surface design
2. Computing the constructional elements
3. Addressing and lay out of the elements
4. Machine code generation
5. Integrated manufacturing

Gilles Gouaty, Ivo Stotz

Mathematical Background

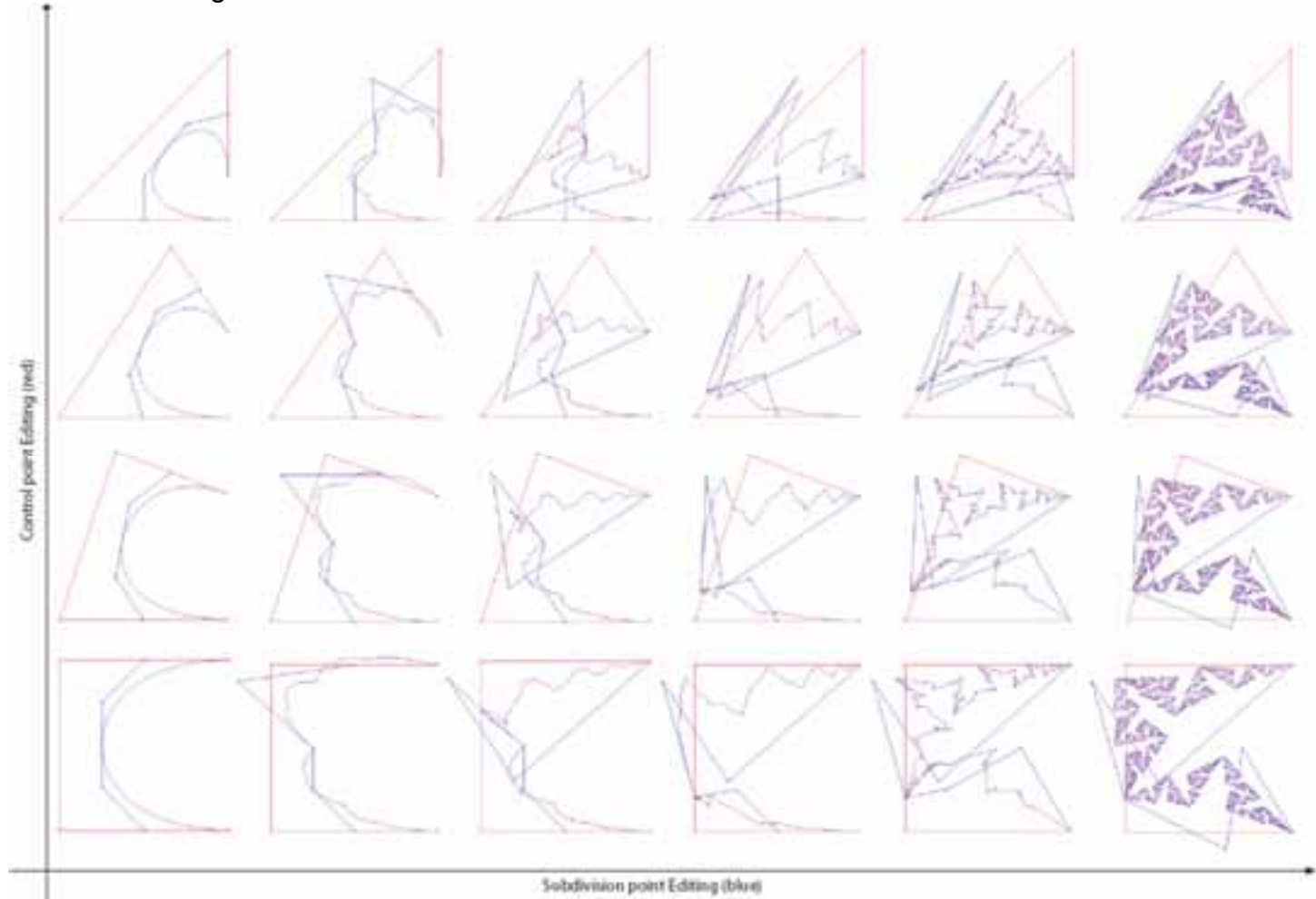
Of monster curves and Iterative geometric figures



Gilles Gouaty, Ivo Stotz

Software Development

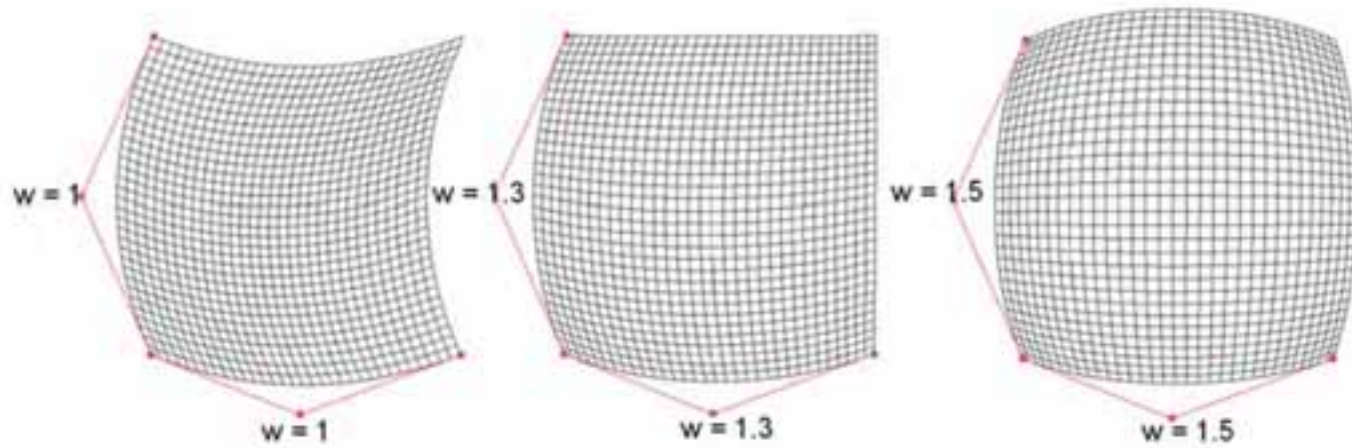
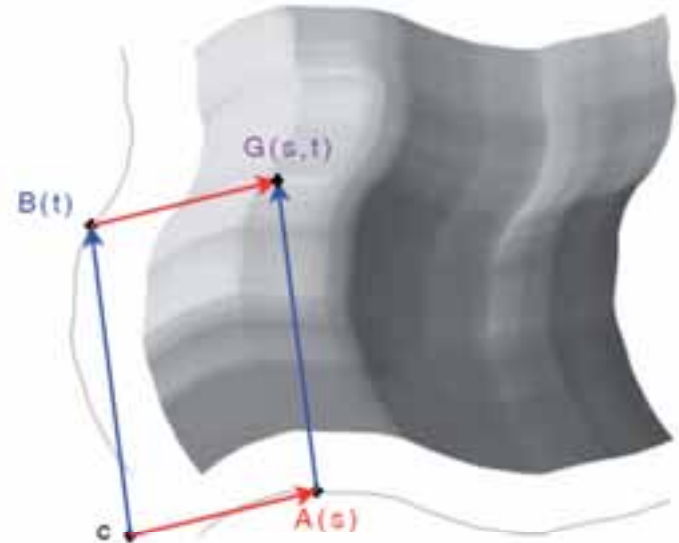
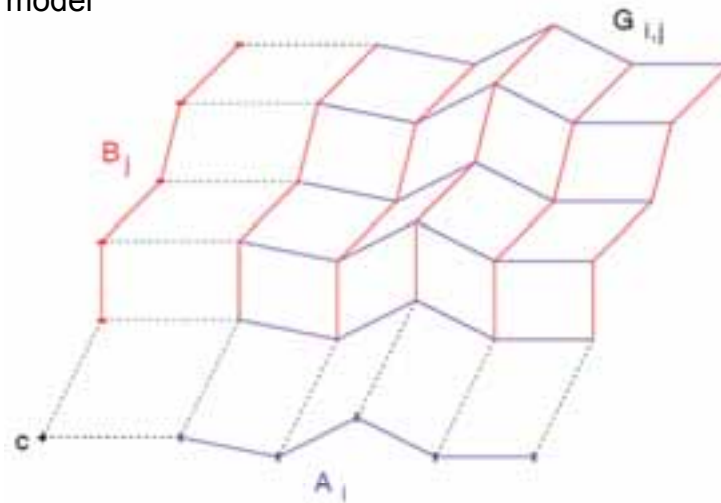
How to: discrete curve design



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Software Development

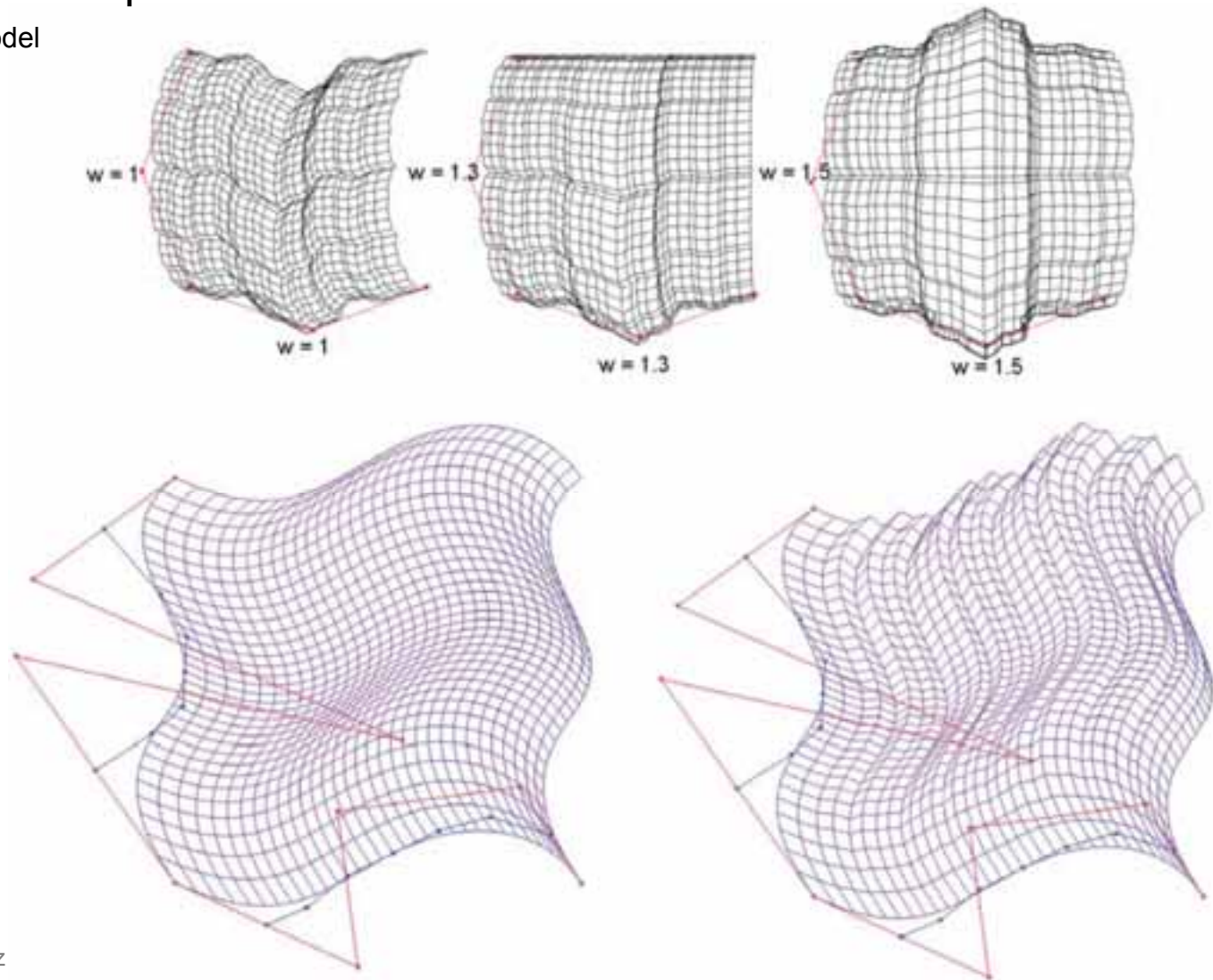
A new surface model



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Software Development

A new surface model

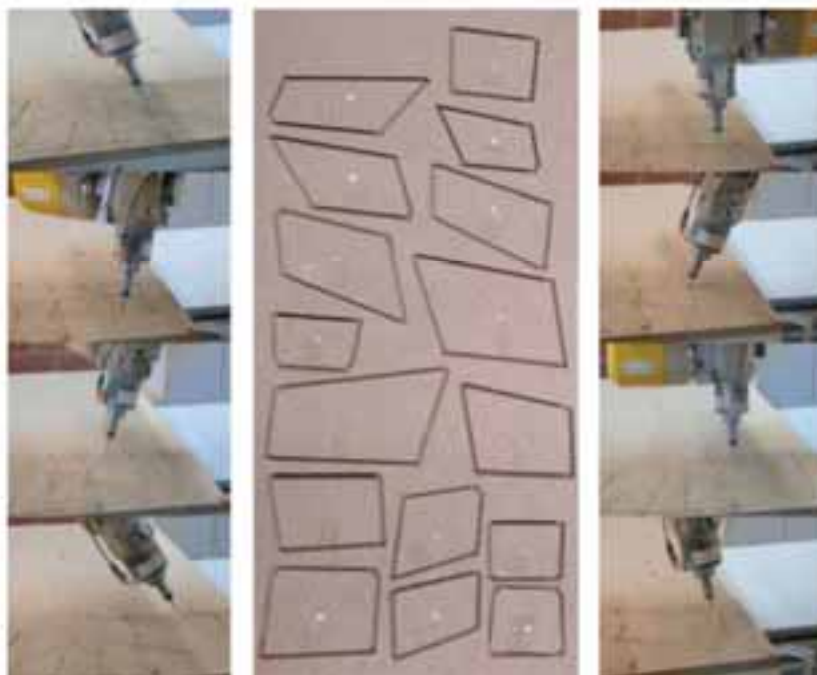
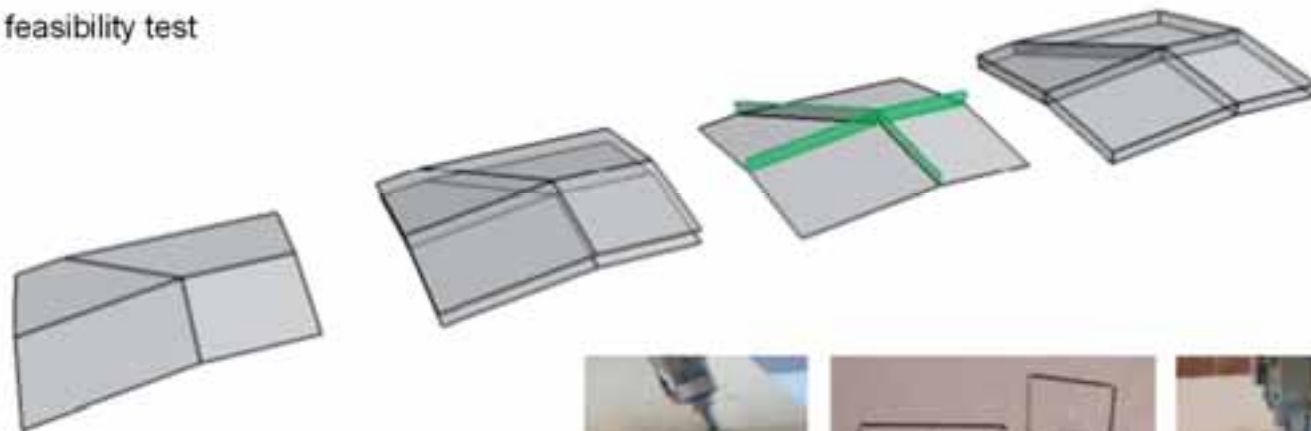


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Yves Weinand

Prototypes

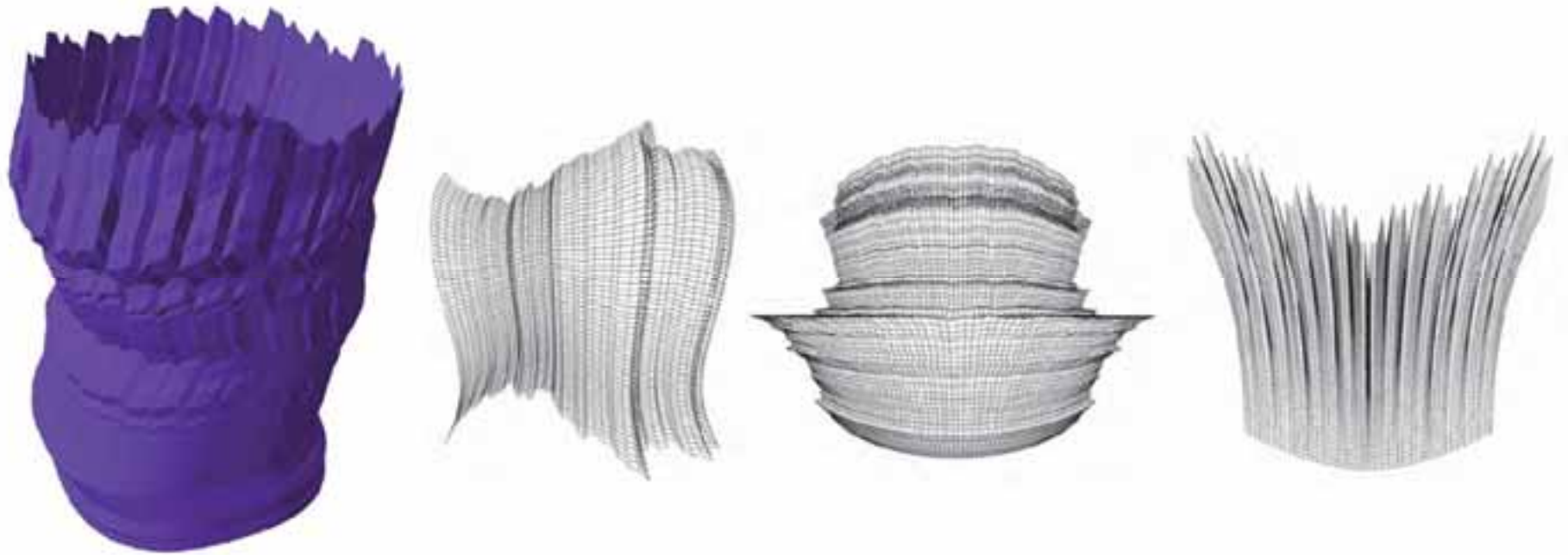
Shell structure – feasibility test



Gilles Gouaty, Ivo Stotz

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Yves Weinand

Design Possibilities



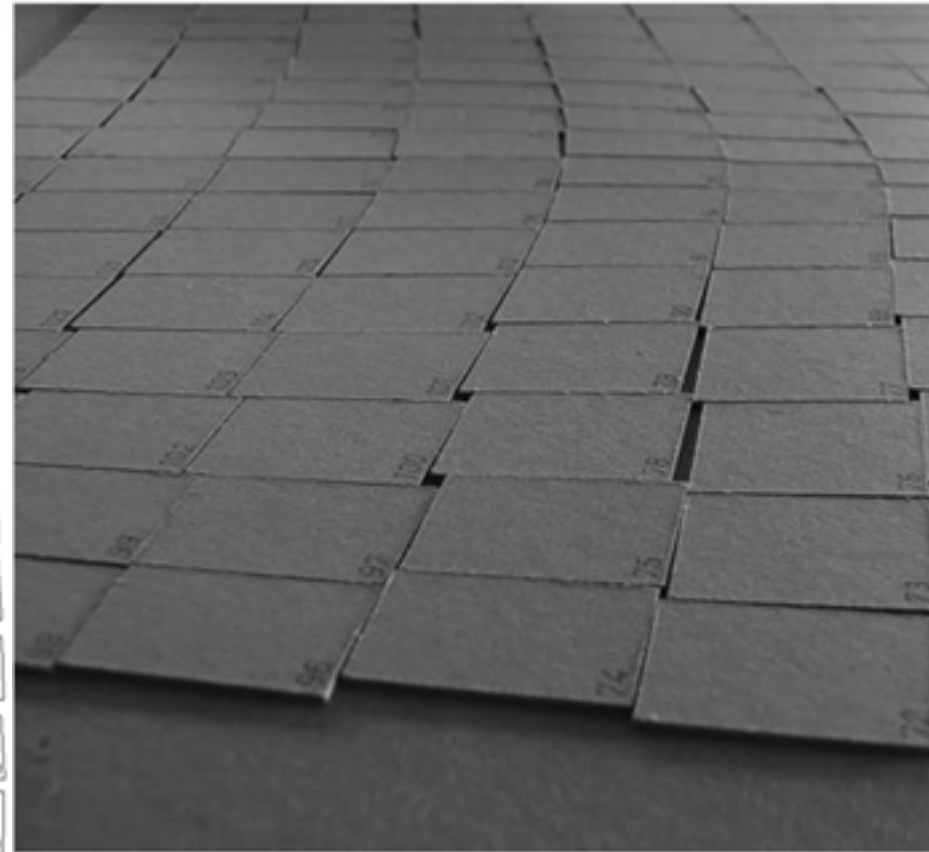
Gilles Gouaty, Ivo Stotz

Innovative Timber Constructions
Yves Weinand

application: B-Spline Shell

Unrolled and addressed list of construction elements

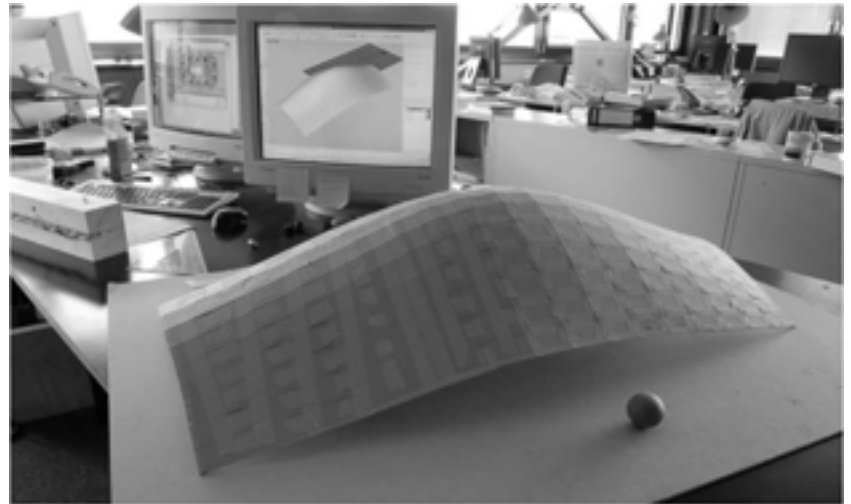
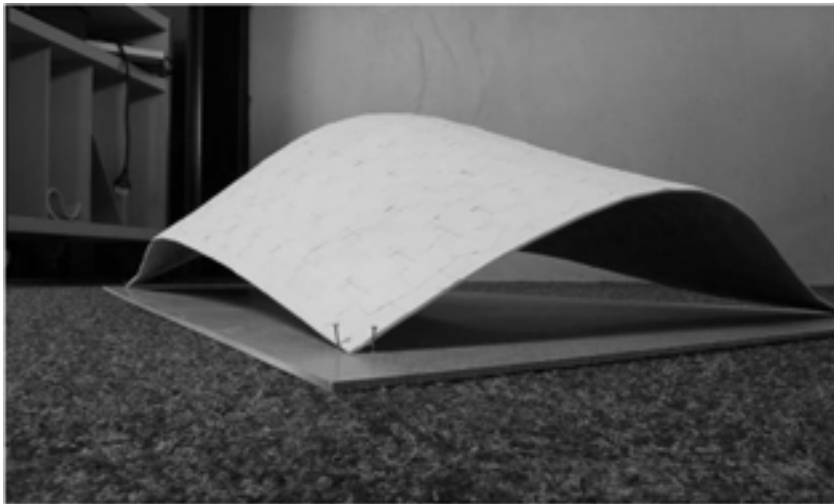
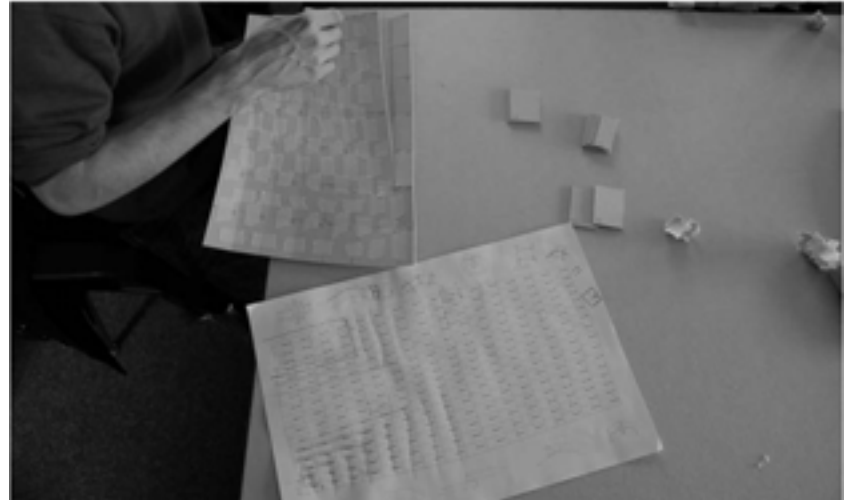
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59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80
119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101	100
139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123	122	121	120
159	158	157	156	155	154	153	152	151	150	149	148	147	146	145	144	143	142	141	140
179	178	177	176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	160
189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173	172	171	170
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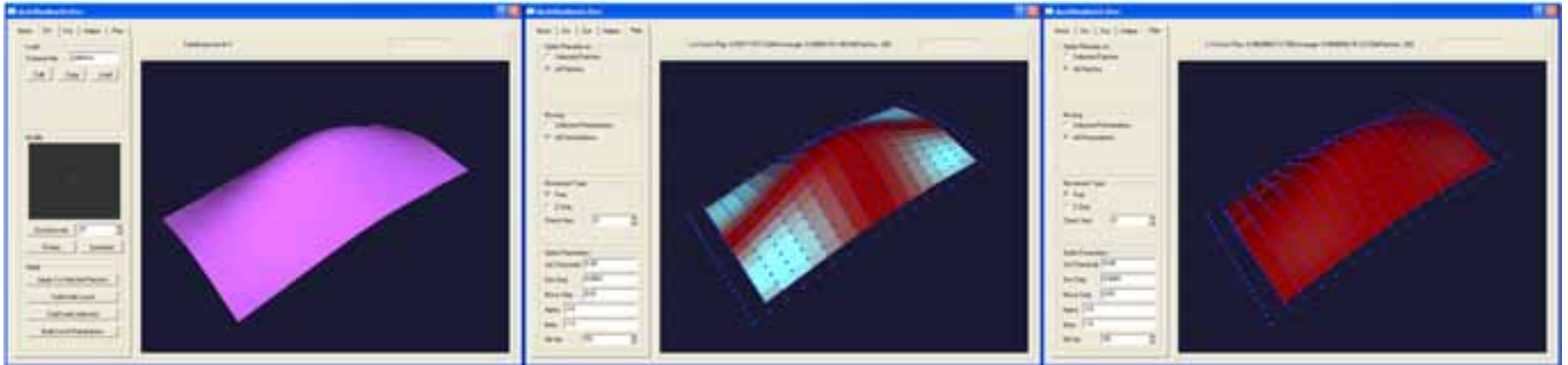
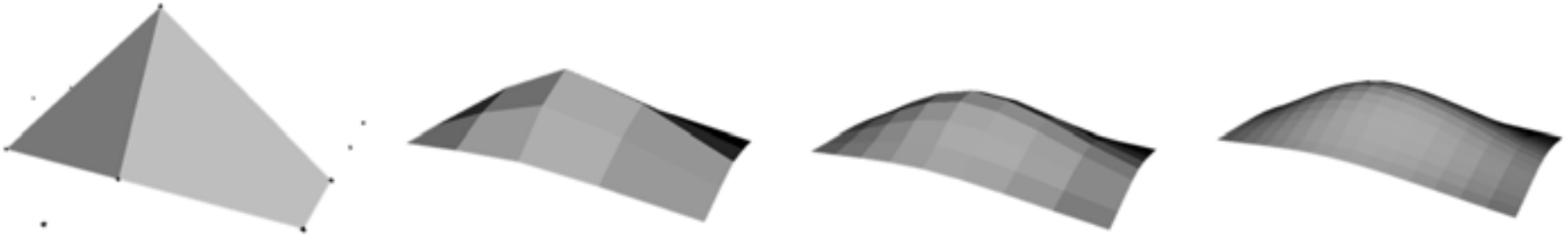
Assembly of the reduced scale model



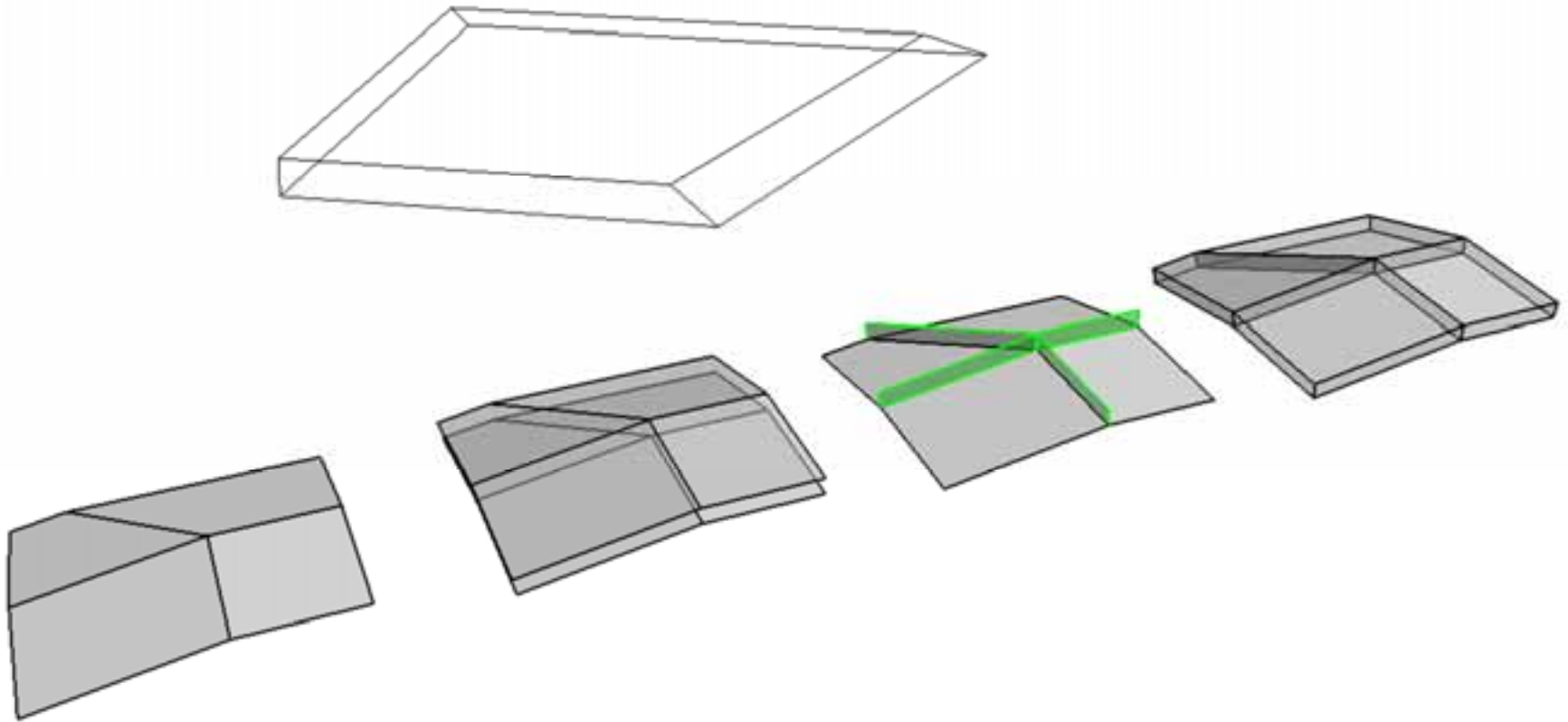
application: B-Spline Shell



application: B-Spline Shell

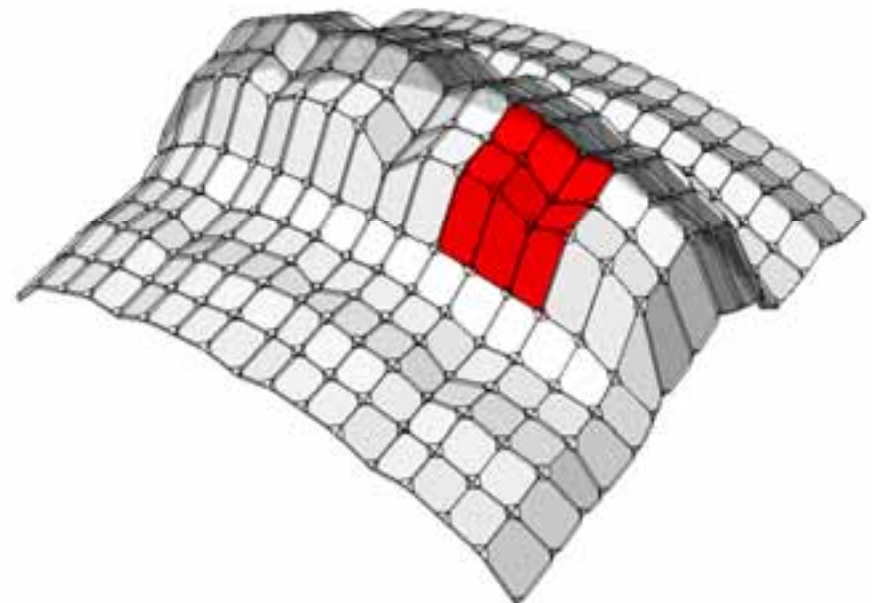
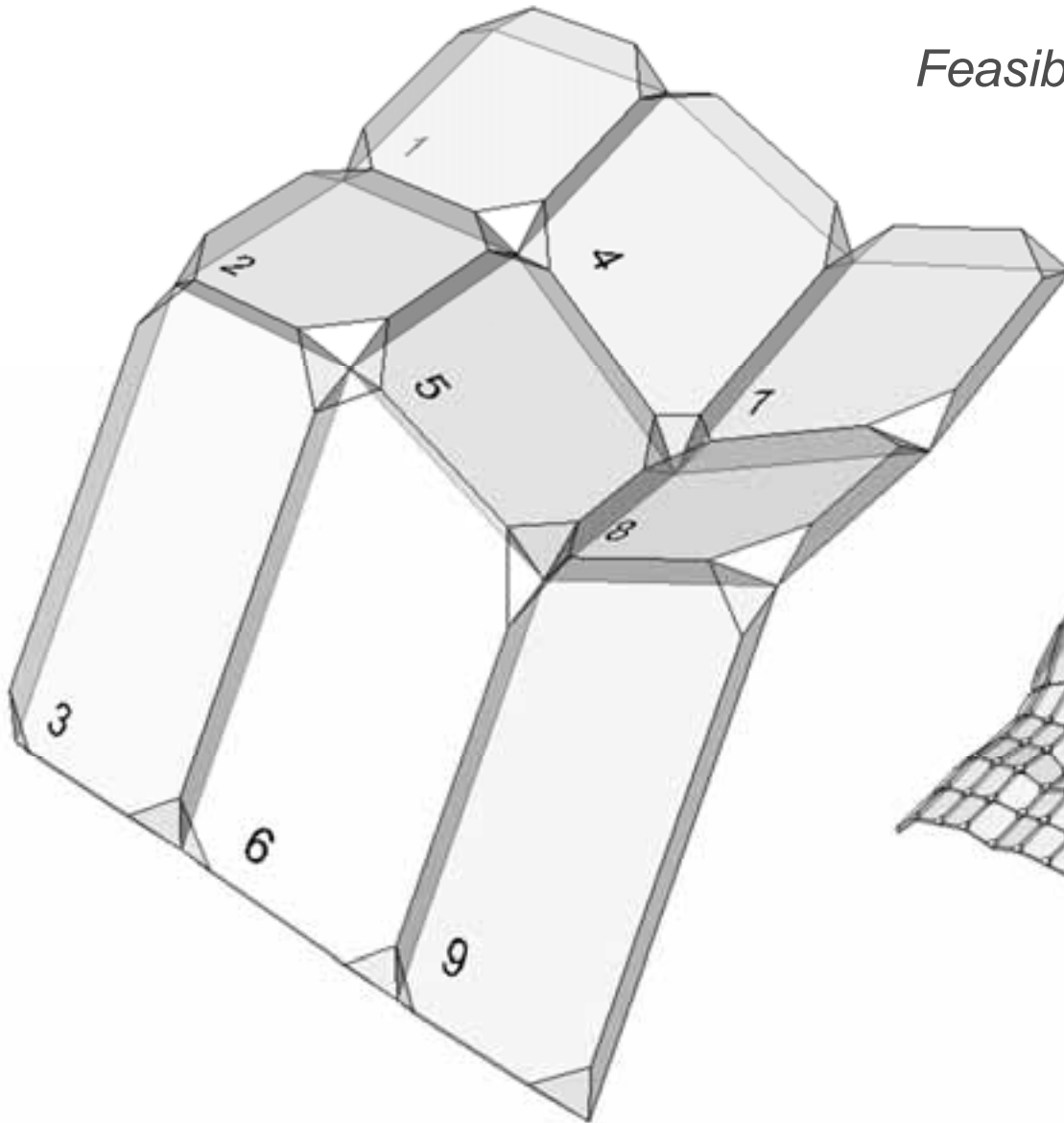


Thickening in order to obtain construction elements

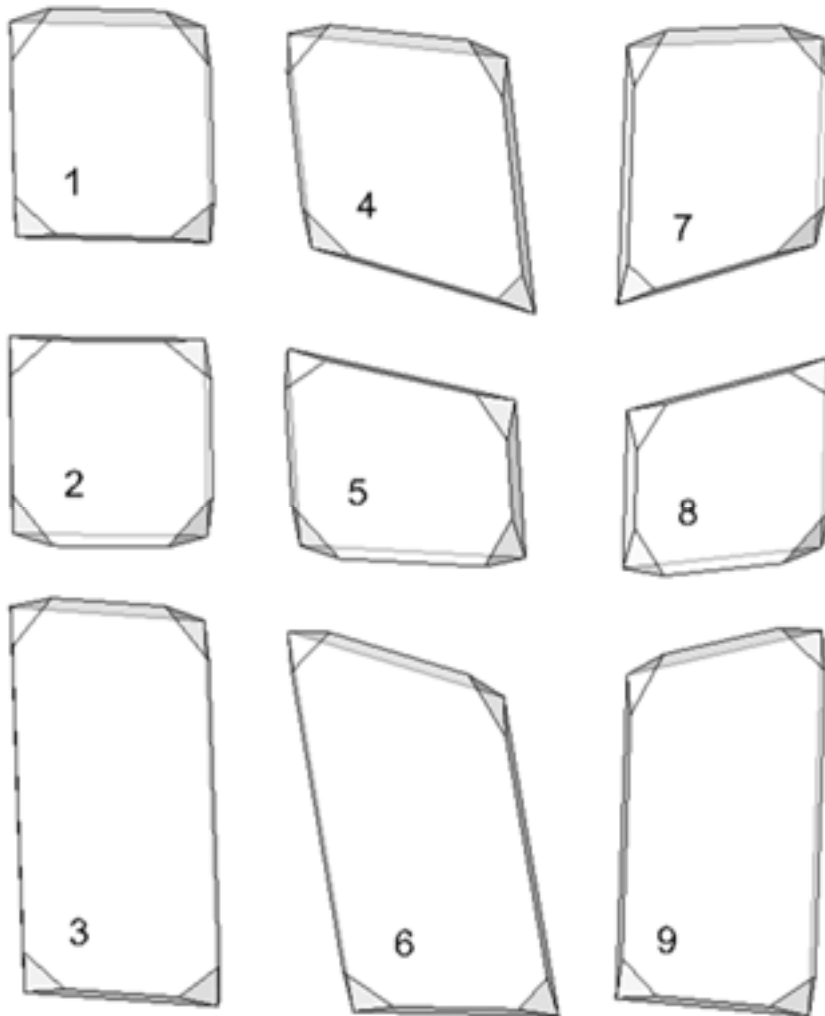


Parallel offset, bisector planes, volume elements

Feasibility study: Partial production



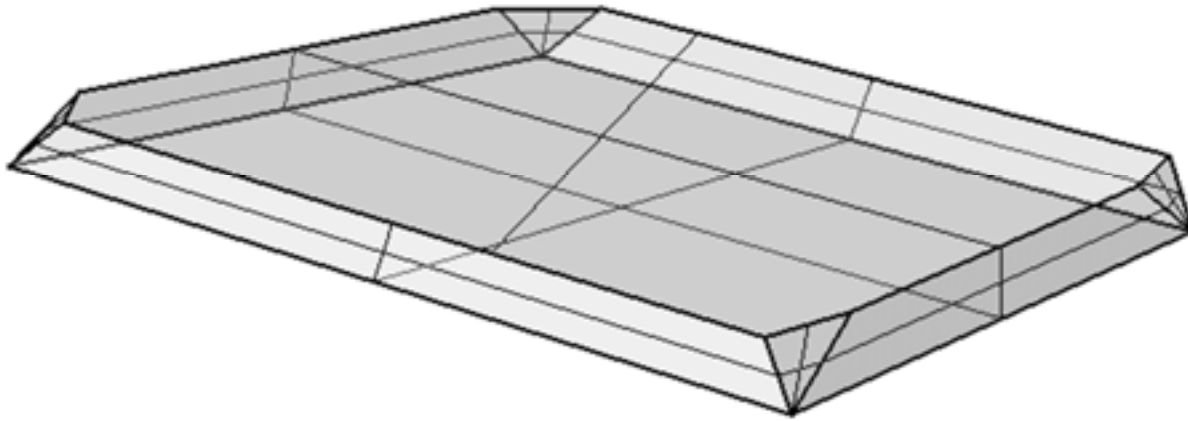
Feasibility study: G-code generation



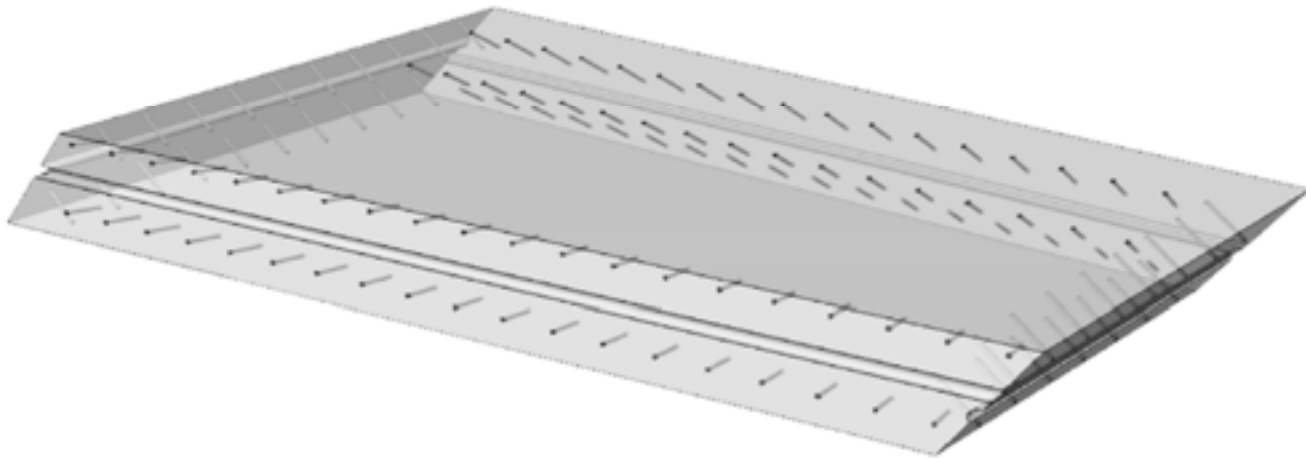
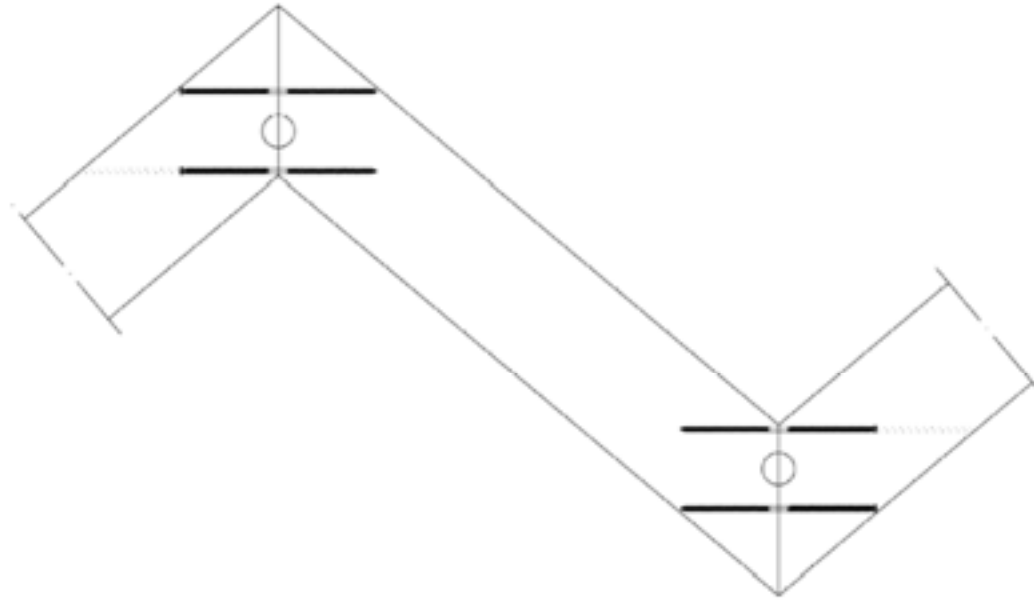
The screenshot shows the ConTEXT software interface, displaying G-code generation for a timber beam cross-section. The code is organized into numbered lines (N1 to N37) and includes various G-code commands such as G0, G1, G2, and G3, along with X, Y, and Z coordinates. The code is displayed in a window titled "ConTEXT - [C:\Documents and Settings\stettr\Bureau\bolletrh001.nc]".

```
!pprog2
N1 G90
N2 G71 T1 R6
N3 G0 X93.0203260604704 Y62.5742002389265
N4 G1 Z-3
N5 G1 X92.5173637881376 Y32.3944638989584
N6 G1 Z6
N7 G0 X108.361877416248 Y60.3013778158484
N8 G1 Z-3
N9 G1 X107.858915143915 Y30.1236414758803
N10 G1 Z6
N11 G0 X96.8557138994148 Y62.005994633157
N12 G1 Z-3
N13 G1 X96.352751627082 Y31.8282582931889
N14 G1 Z6
N15 G0 X104.5264889577304 Y60.8498834216179
N16 G1 Z-3
N17 G1 X104.023527304871 Y30.6918470816498
N18 G1 Z6
N19 G0 X100.691101738389 Y61.4377860273875
N20 G1 Z-3
N21 G1 X100.188139466026 Y31.2400526874193
N22 G1 Z6
N23 G0 X154.38651148358 Y53.482910546614
N24 G1 Z-3
N25 G1 X153.883569211248 Y33.3051742066458
N26 G1 Z6
N27 G0 X116.032653094137 Y59.1649666043093
N28 G1 Z-3
N29 G1 X115.529690821804 Y28.9872302643412
N30 G1 Z6
N31 G0 X119.848040933081 Y58.5947609985398
N32 G1 Z-3
N33 G1 X119.365078660748 Y28.4190246585714
N34 G1 Z6
N35 G0 X112.197265255192 Y59.7331722100789
N36 G1 Z-3
N37 G1 X111.694302982859 Y29.5554358701107
M38 G1 F4
```

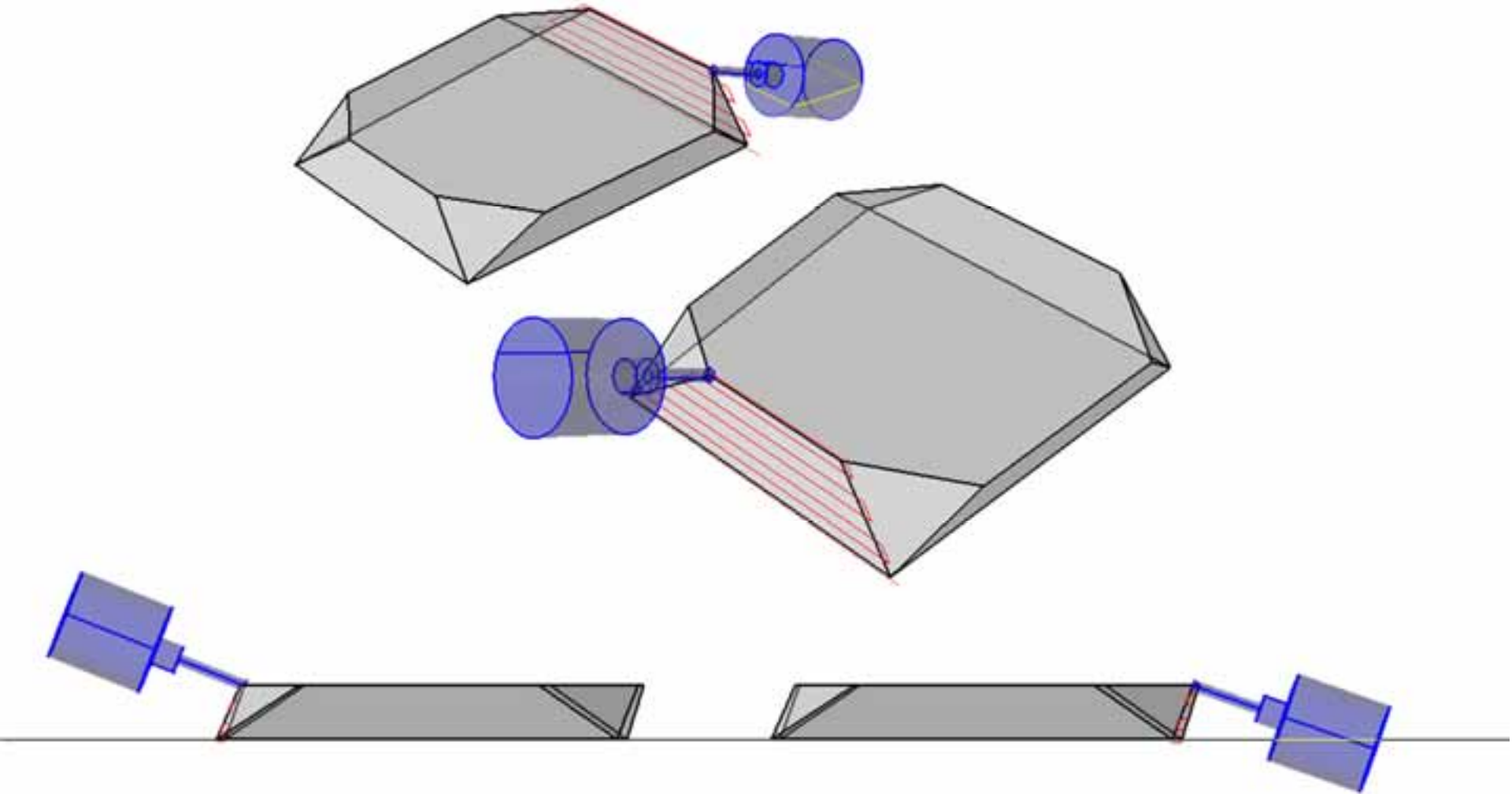

Automated detailing



Detail study

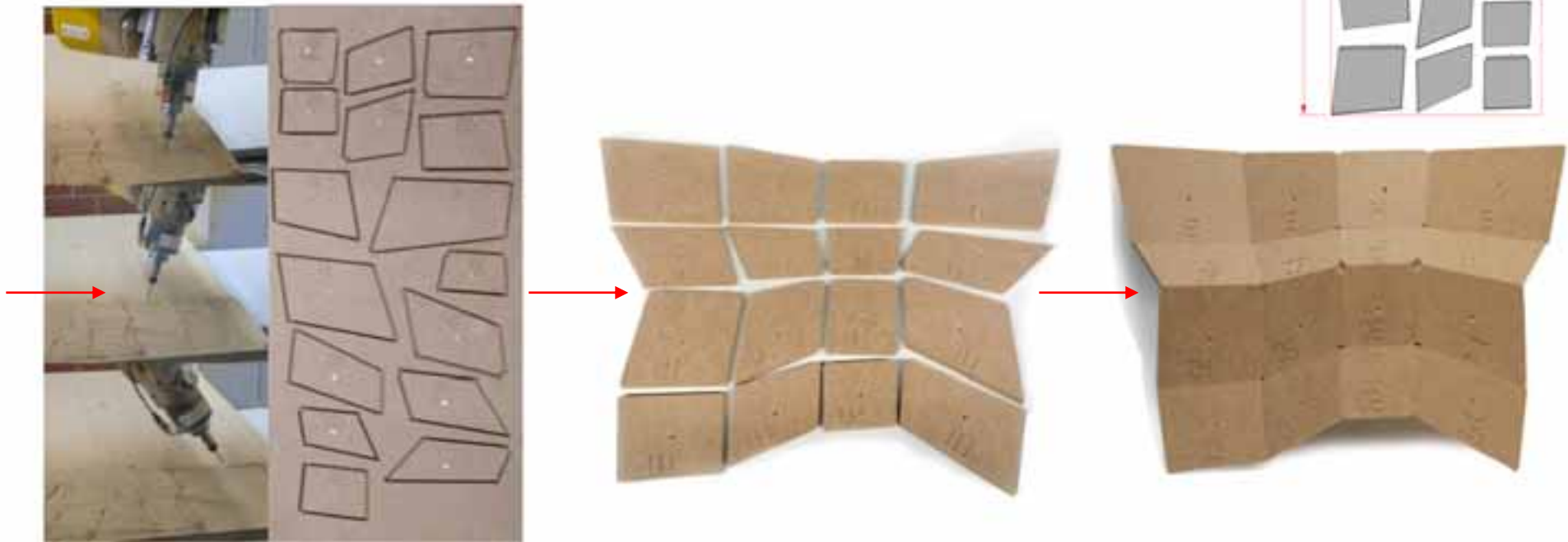
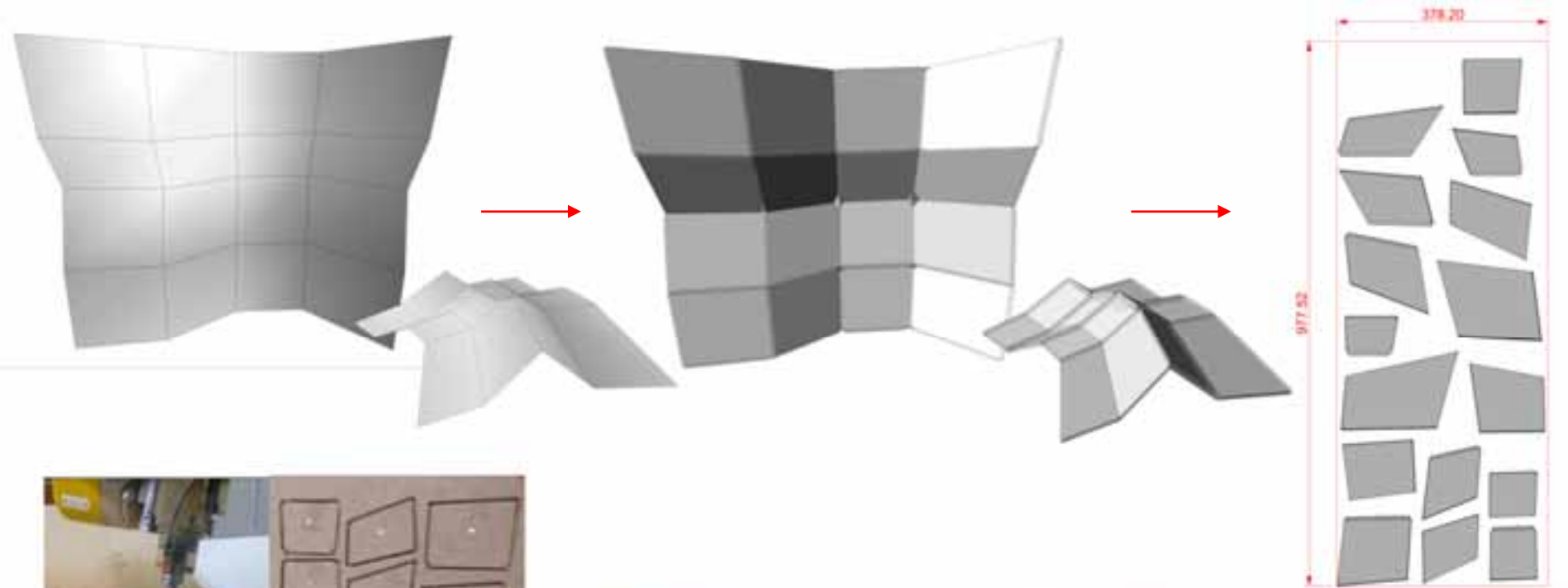


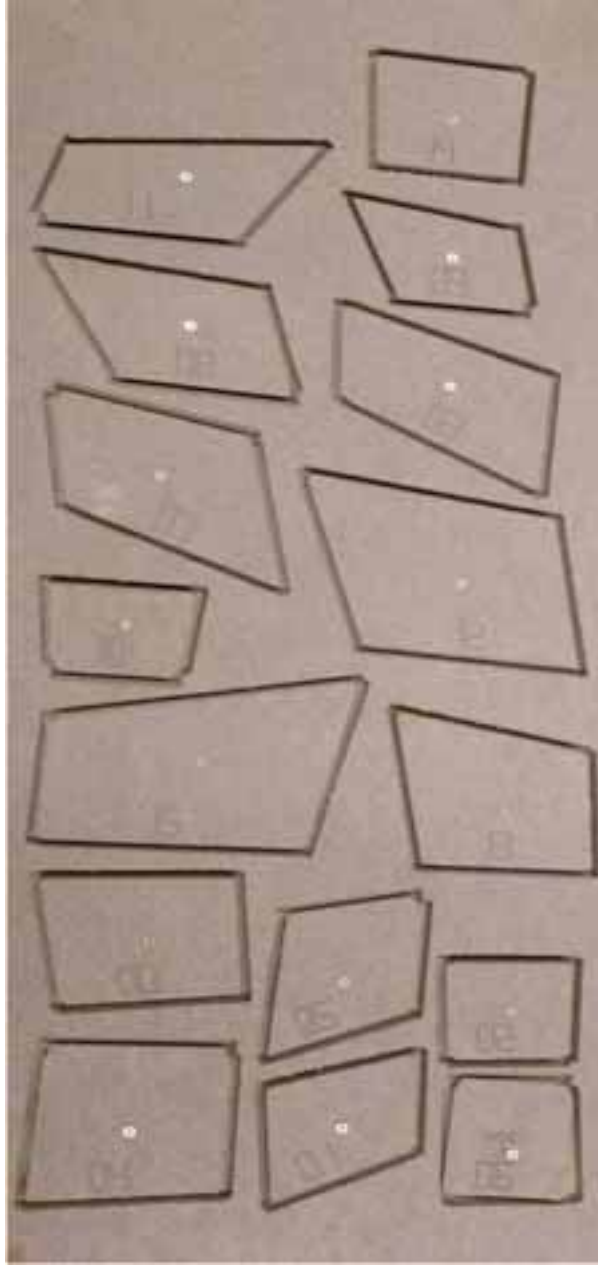
Feasibility study: G-code simulation



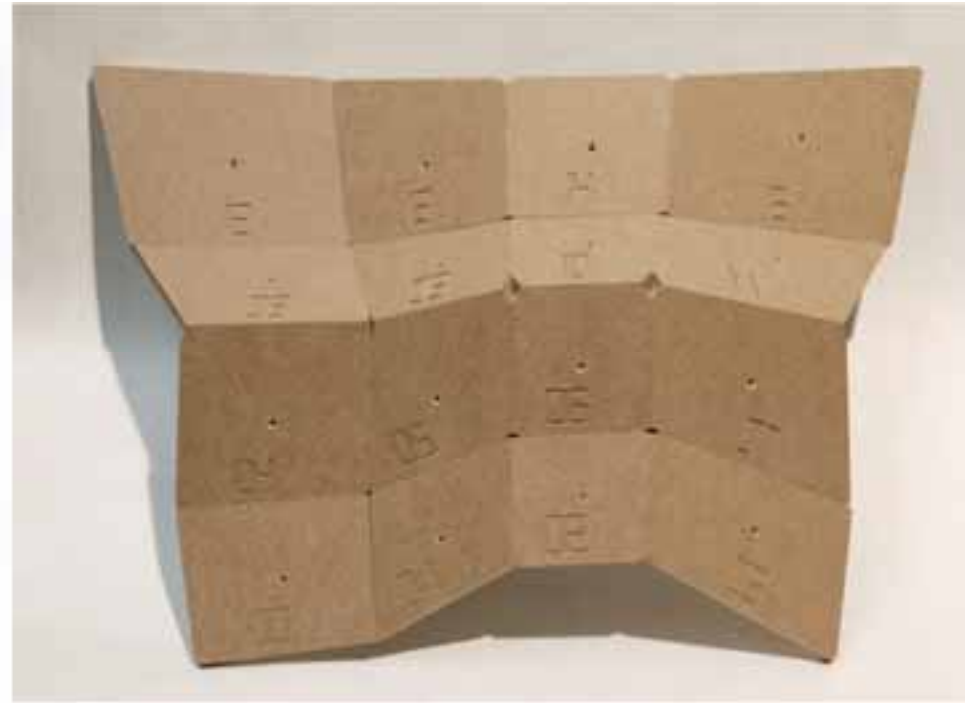


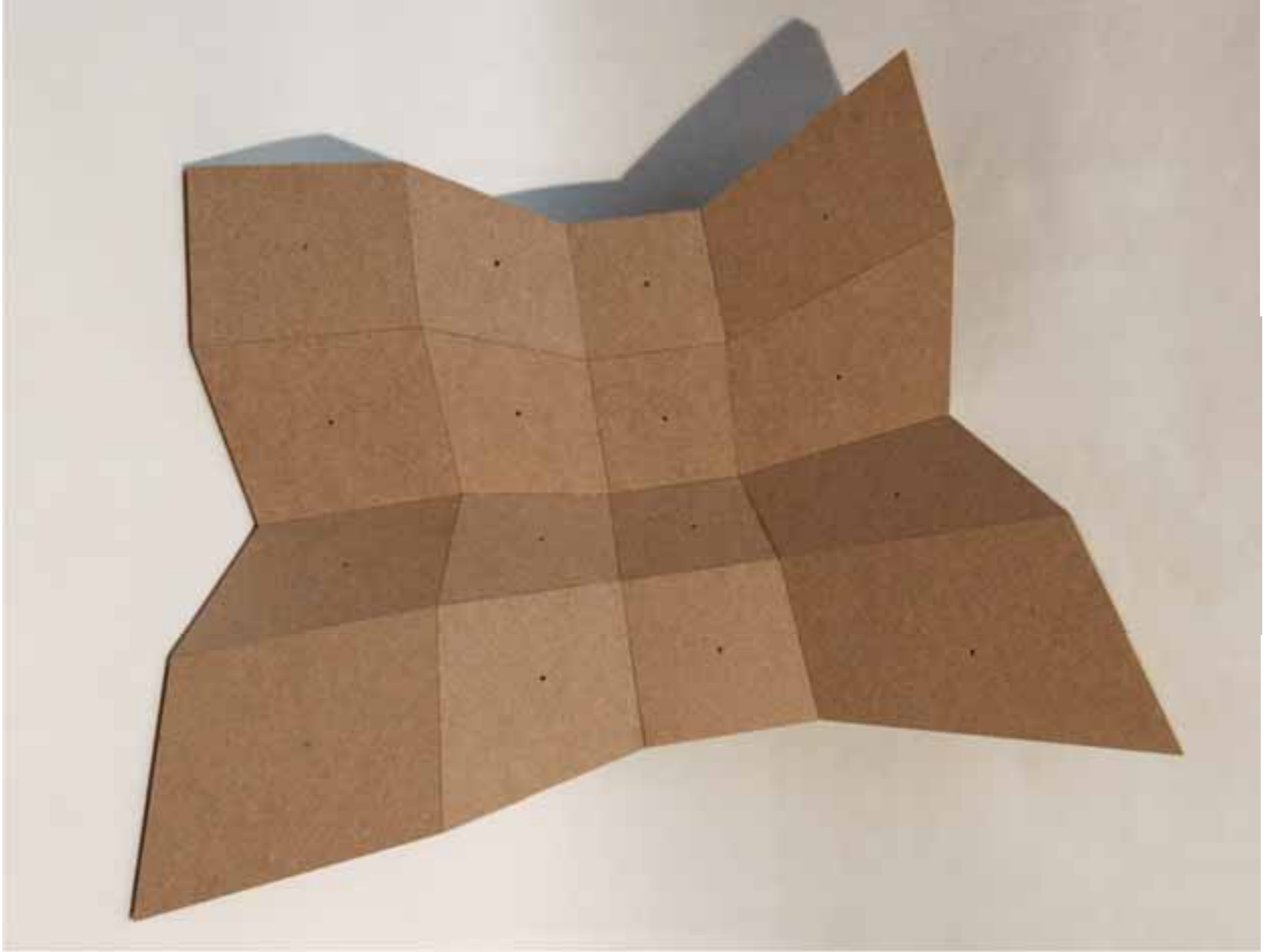
Gilles Gouaty, Ivo Stotz





Feasibility study: 4x4 Prototype





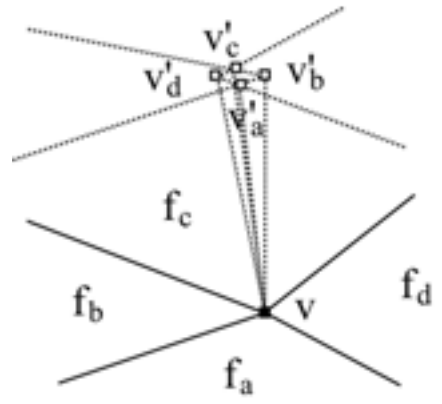
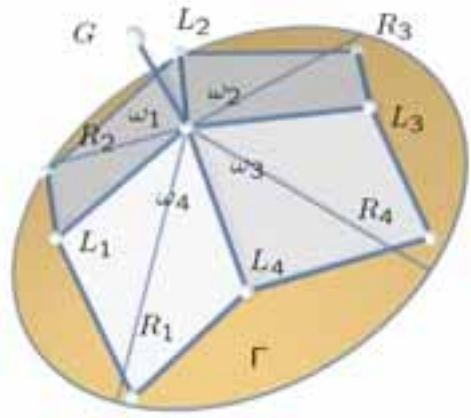
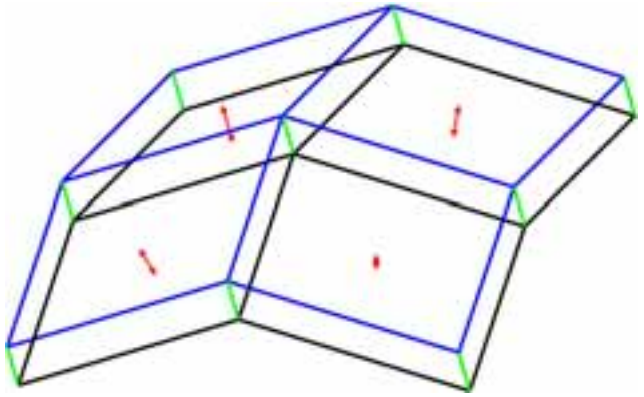
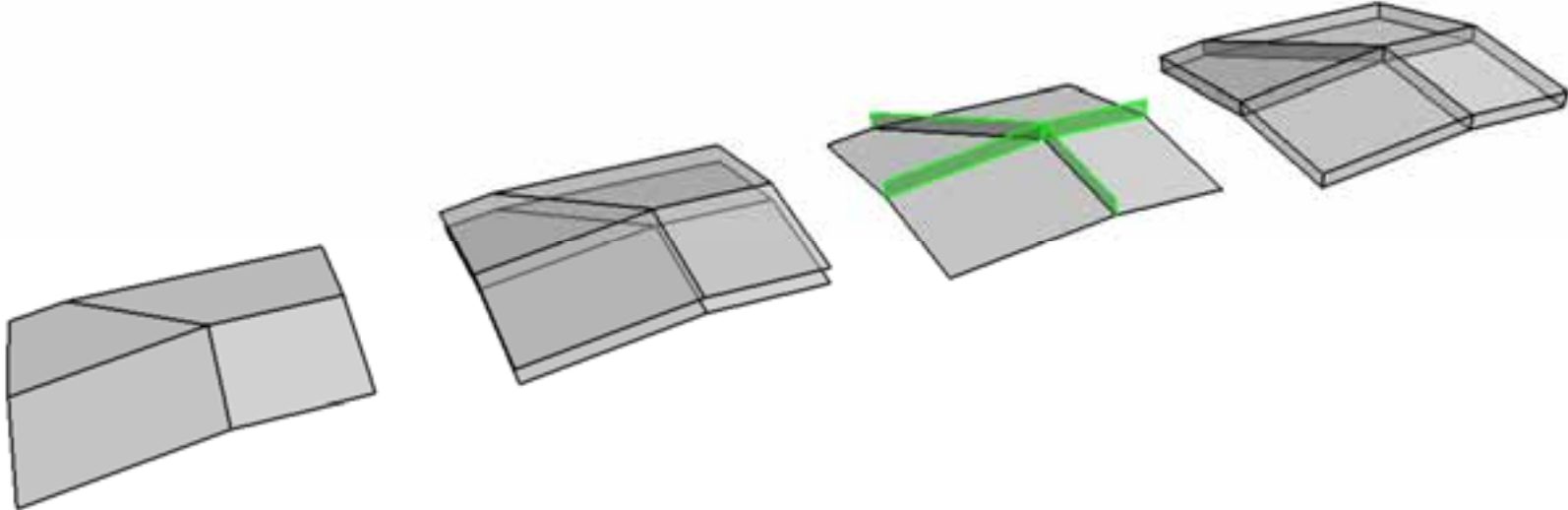
Feasibility study: 8x8 Prototype



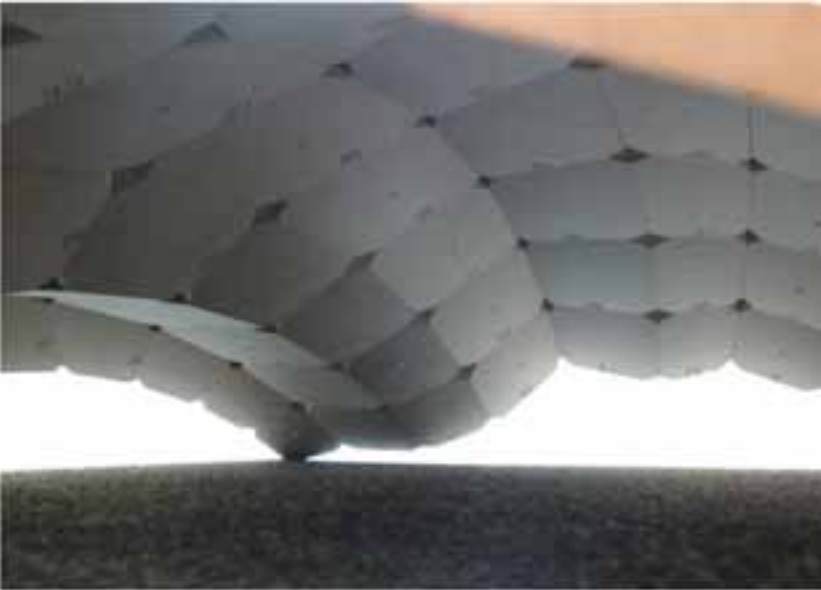
Gilles Gouaty, Ivo Stotz

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Yves Weinand

Offset

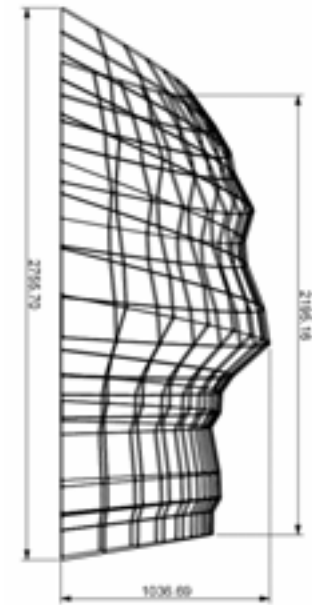
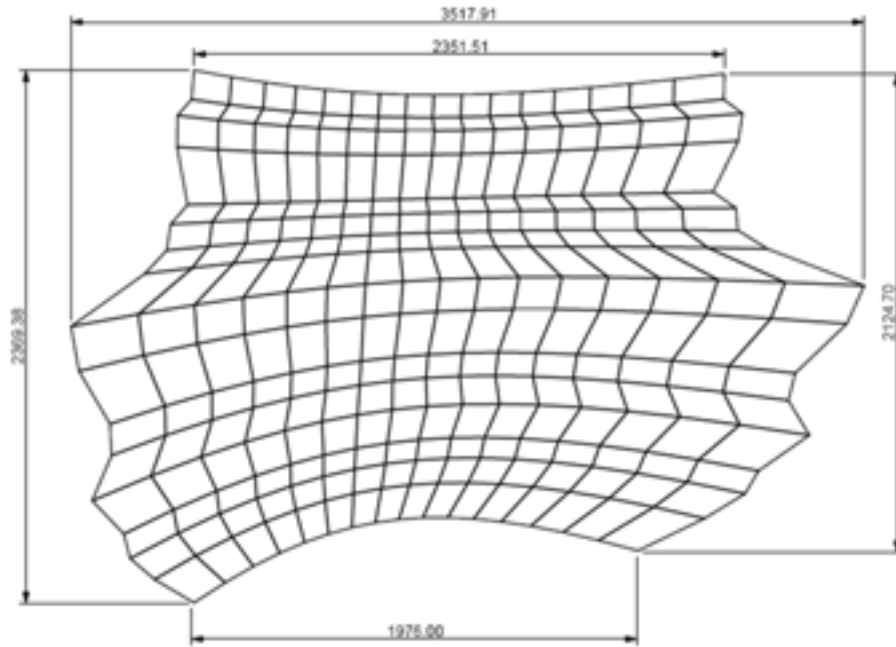
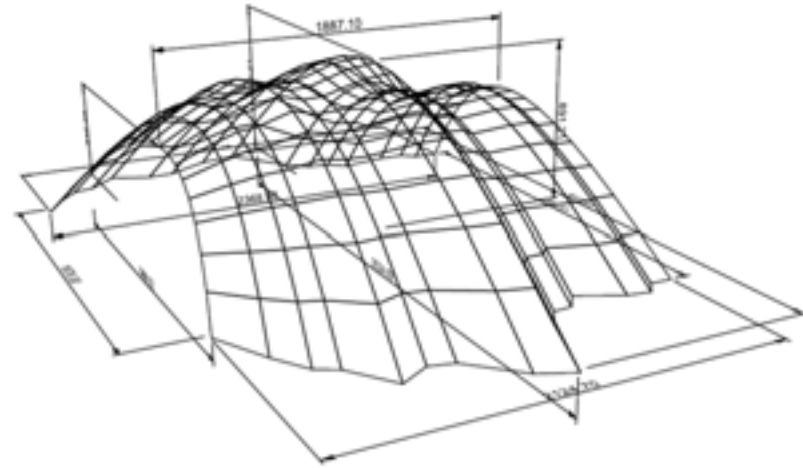
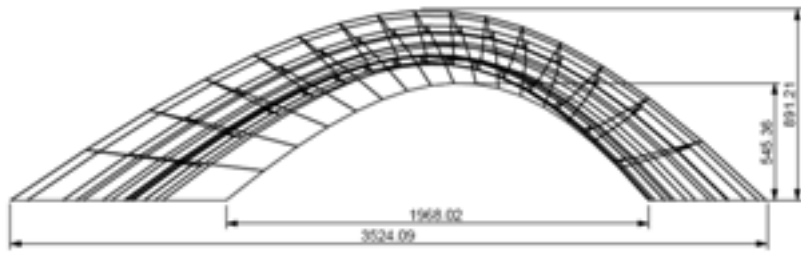


Feasibility study: 8x8 Prototype

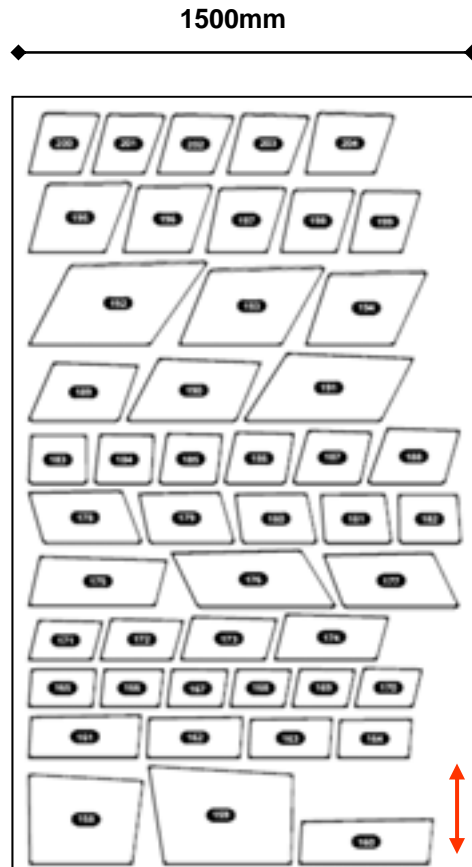
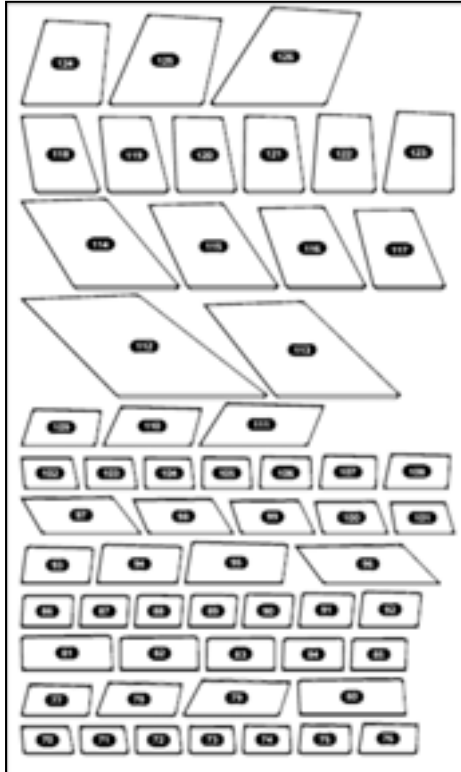
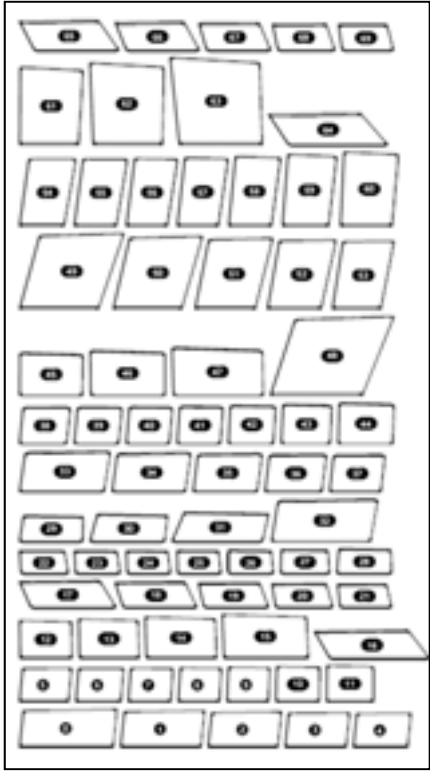


Collaborators – Gilles Gouaty, Ivo Stotz

Innovative Timber Constructions
Yves Weinand



Collaborators – Gilles Gouaty, Ivo Stotz



Gilles Gouaty, Ivo Stotz

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Yves Weinand



Gilles Gouaty, Ivo Stotz

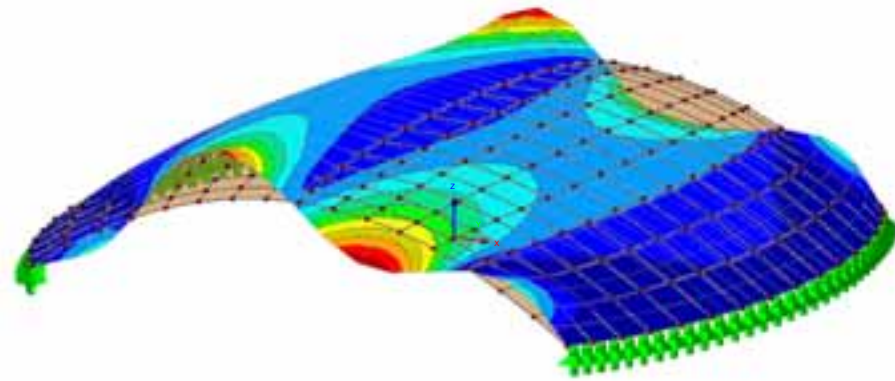
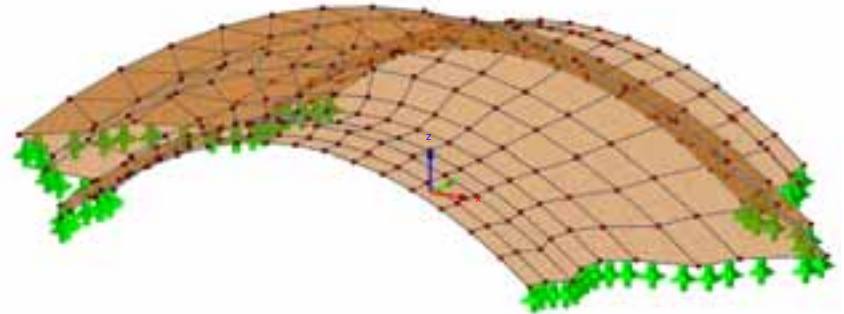
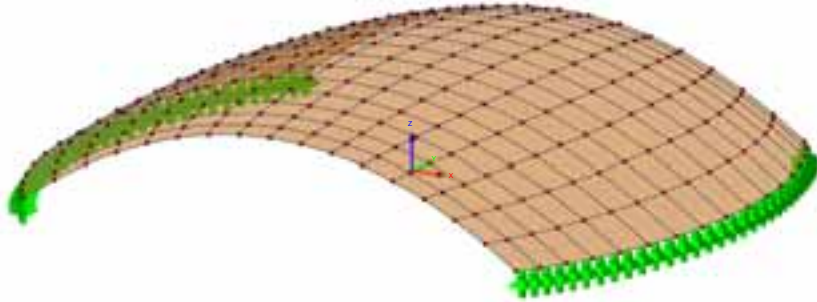
Innovative Timber Constructions
Yves Weinand



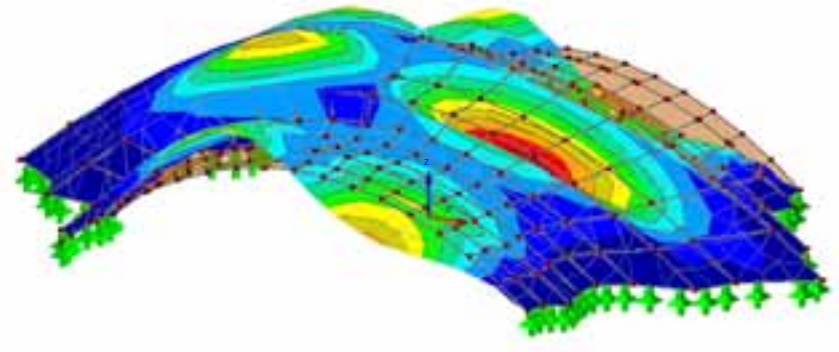
Gilles Gouaty, Ivo Stotz

Innovative Timber Constructions
Yves Weinand

Exemple d'une coque mince (20mm) de 12m de portée sous un cas de charge asymétrique (neige) :



dZmax = 220mm



dZmax = 45mm

Gilles Gouaty, Ivo Stotz

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Origami, architecture

Goal

Folded plate structures with cross laminated timber panels



Hani Buri

Innovative Timber Constructions
Yves Weinand

Geodesic rib shells



Johannes Natterer

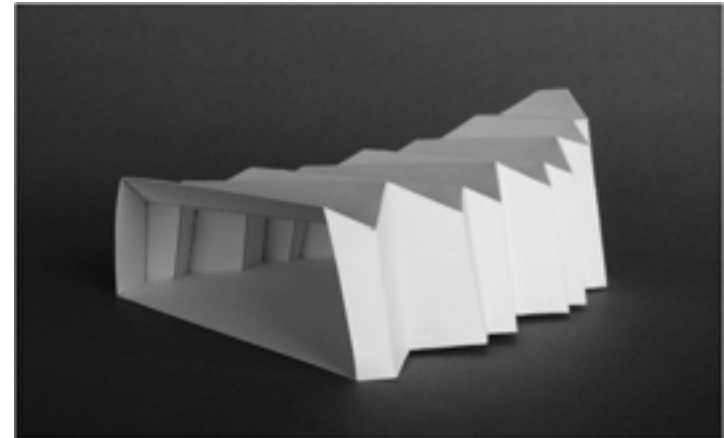
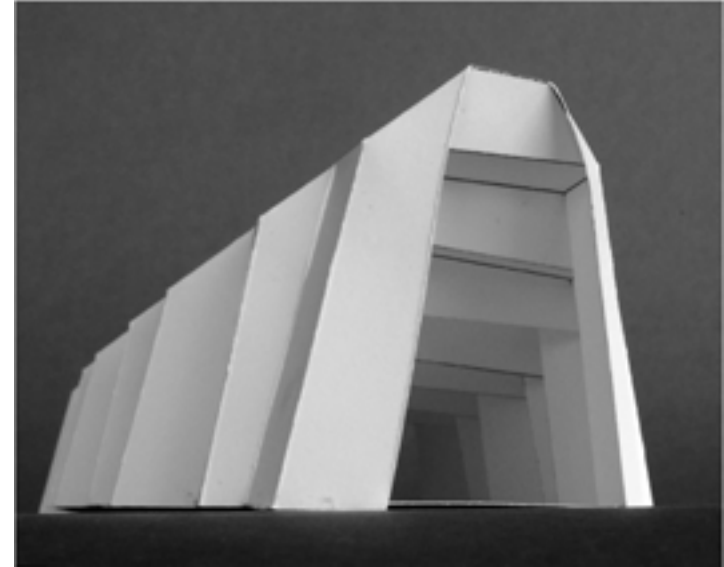
Innovative Timber Constructions
Yves Weinand

2008, Chapelle St-Loup

Maître d'ouvrage : Communauté de diaconesses de Saint Loup

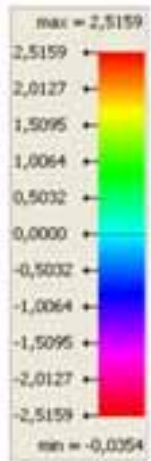
Architecte: Localarchitecture / Atelier d'architecture Danilo Mondada, Shel

(Hani Buri, Yves Weinand; Architecture, engineering and production Design)

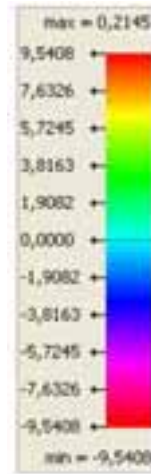
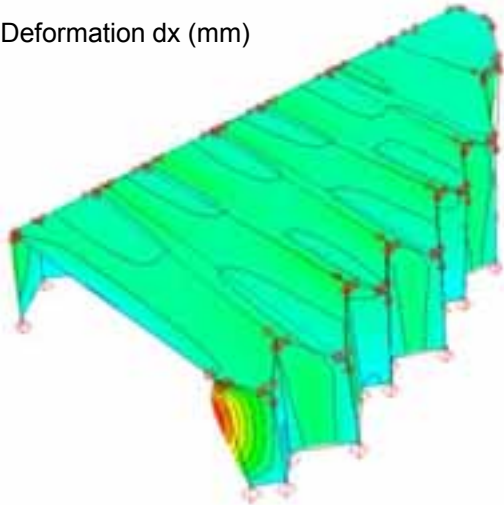


GROUPEMENT D'ARCHITECTES
Localarchitecture, Atelier d'architecture Danilo Mondada

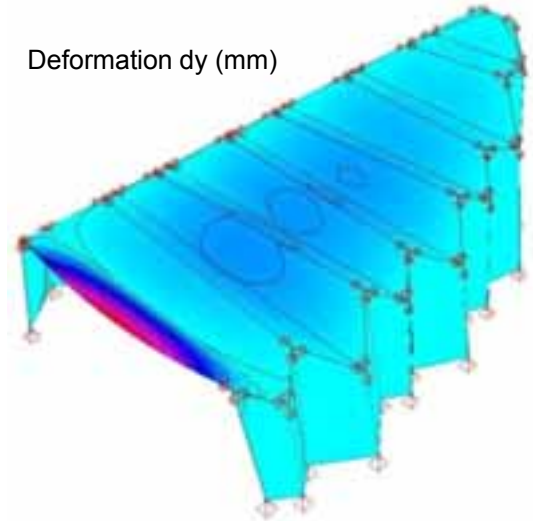
SHEL (architecture, engineering, production design)
Hani Buri, Yves weinand



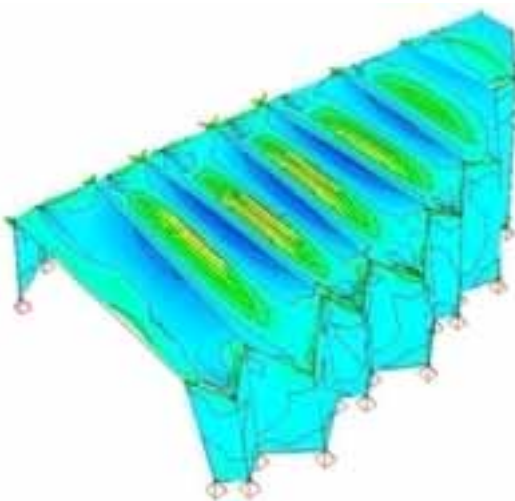
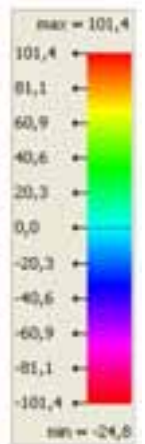
Deformation dx (mm)



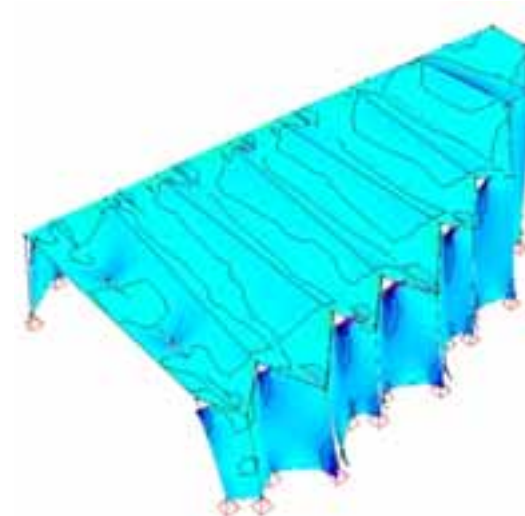
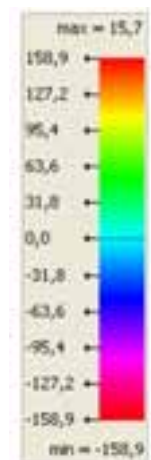
Deformation dy (mm)



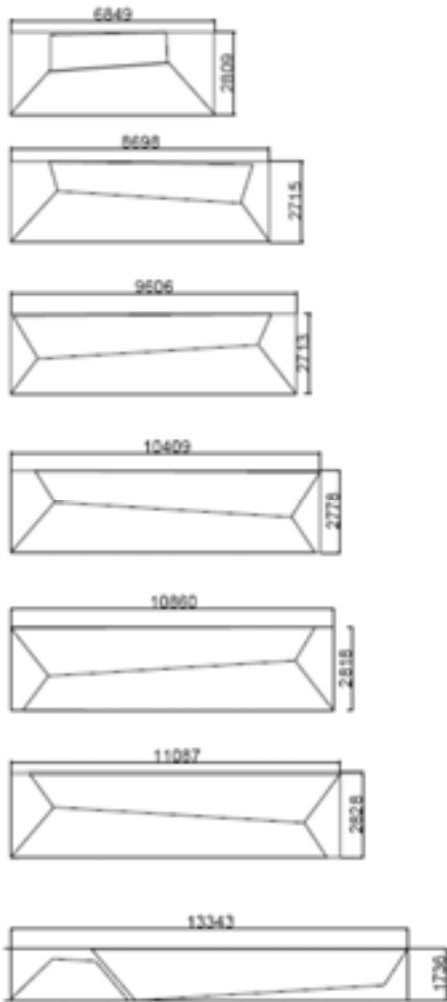
Membrane effort Nx



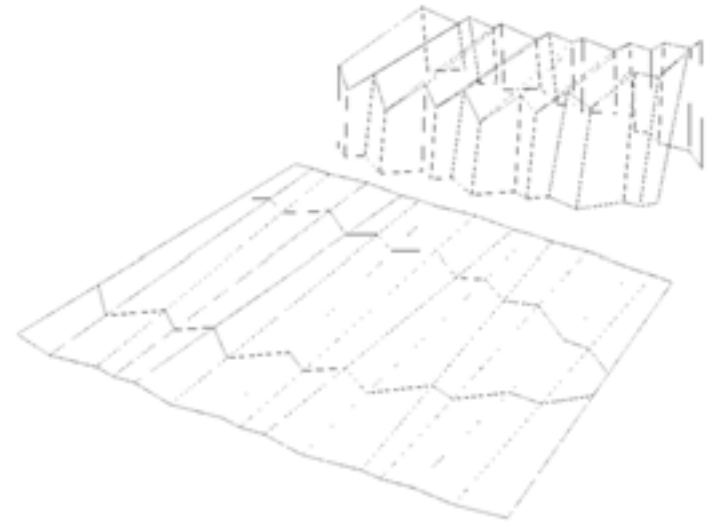
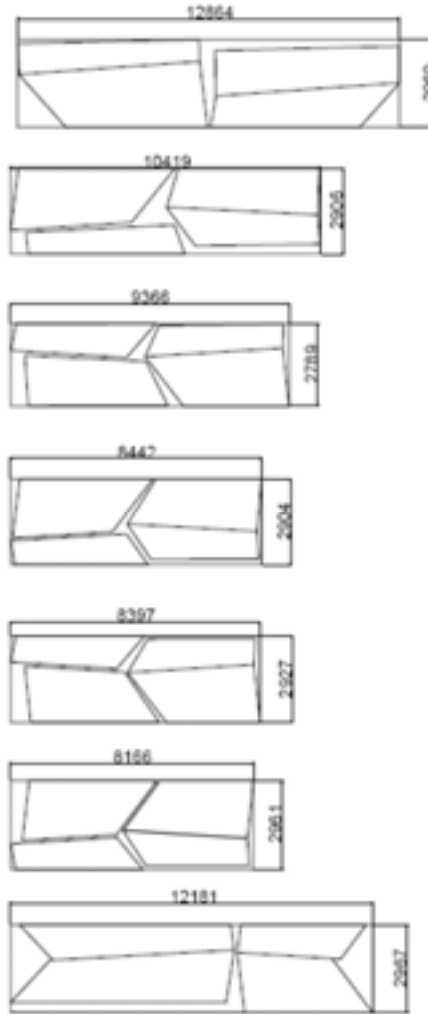
Membrane effort Nz

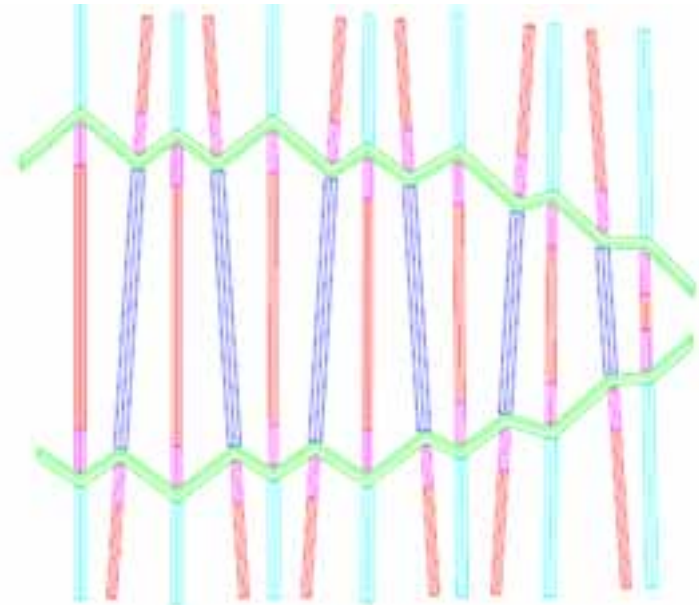
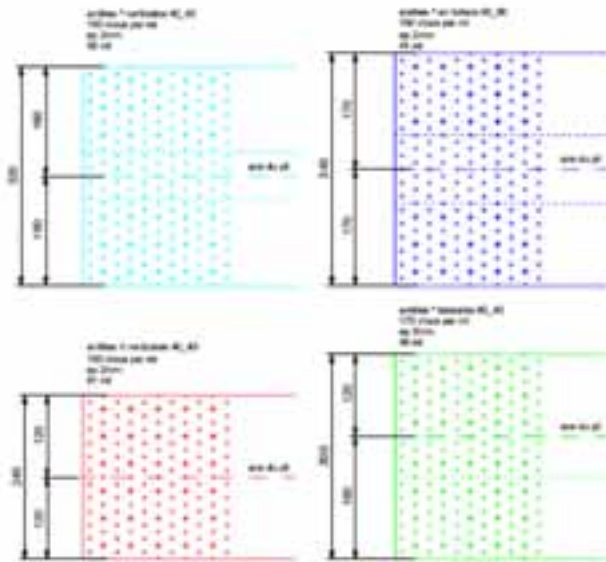


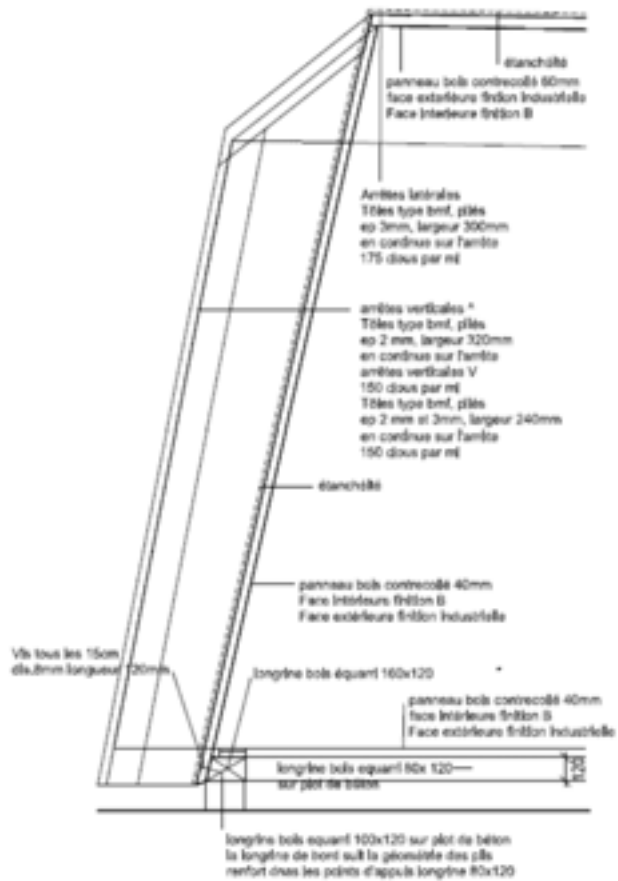
Timber block panels horizontal 60mm 151m2 net



Timber block panels vertical 40mm 175m2 net









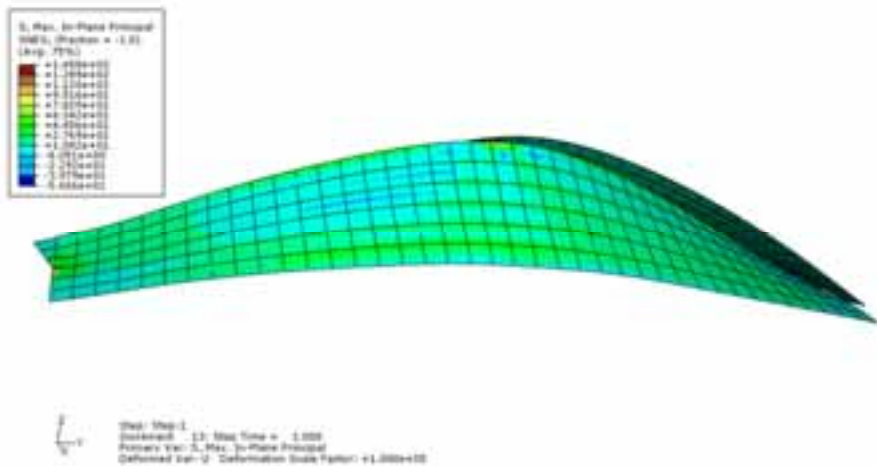
Innovative Timber Constructions
Yves Weinand



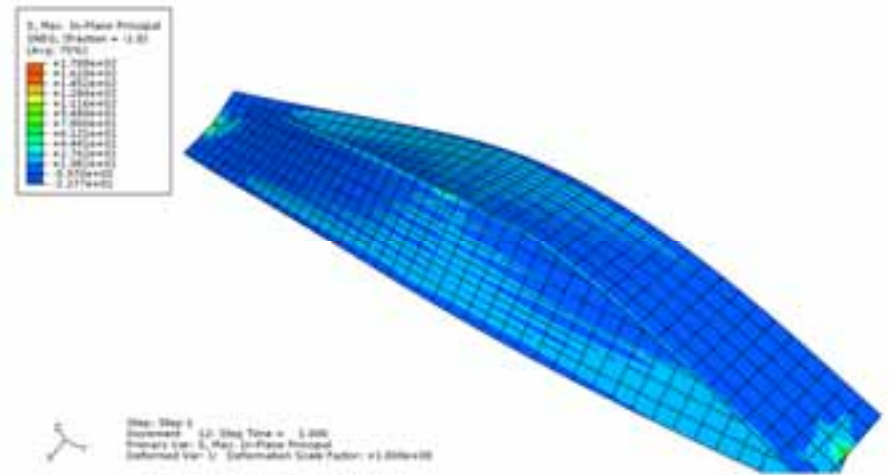
Maximum principal internal stresses for two proportion

Proportion (length/width)= 7
Length= 11.55 m, Width= 1.65 m

Proportion (length/width)= 8.7
Length= 11.55 m, Width= 1.32 m



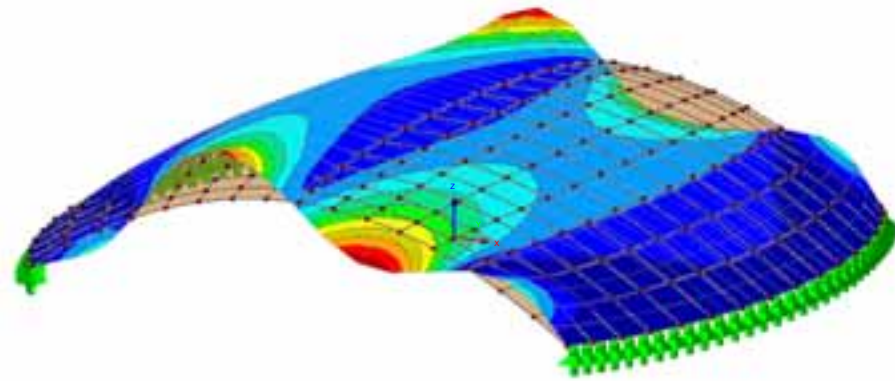
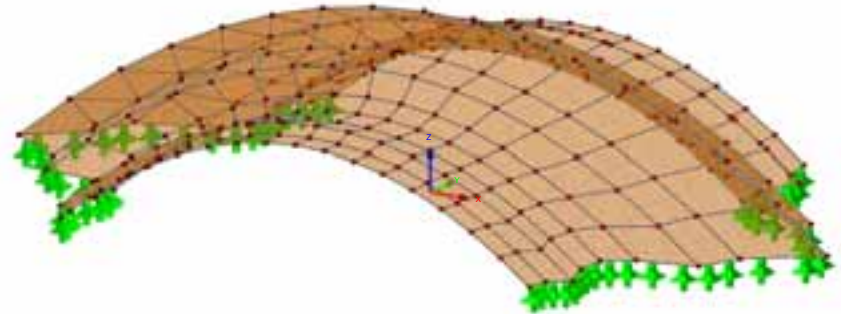
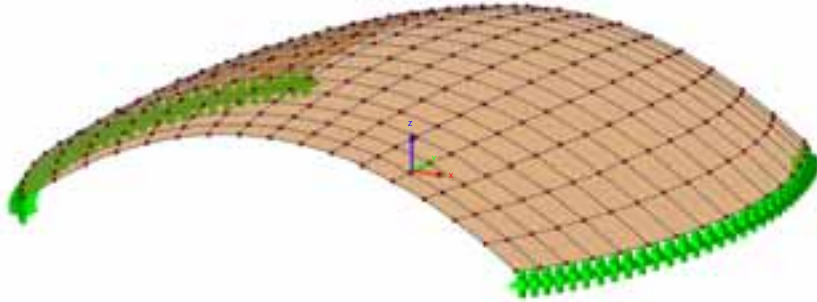
Maximum Principal stress= 46 MPa



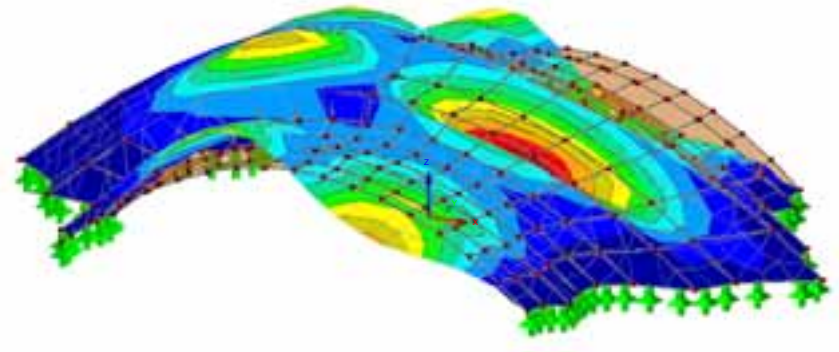
Maximum Principal stress= 29 MPa

Masoud Sistaninia

Exemple d'une coque mince (20mm) de 12m de portée sous un cas de charge asymétrique (neige) :



dZmax = 220mm

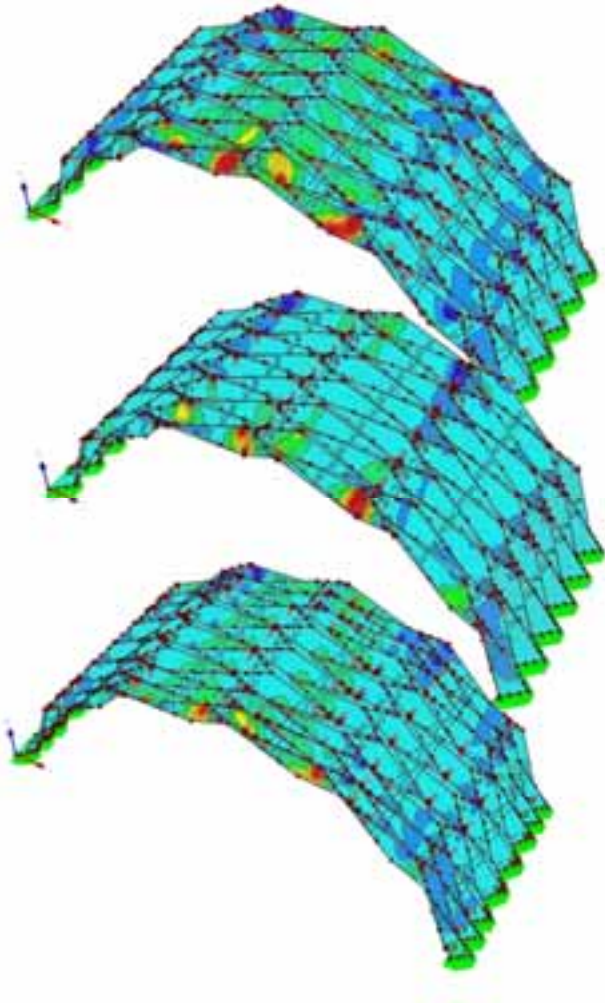


dZmax = 45mm

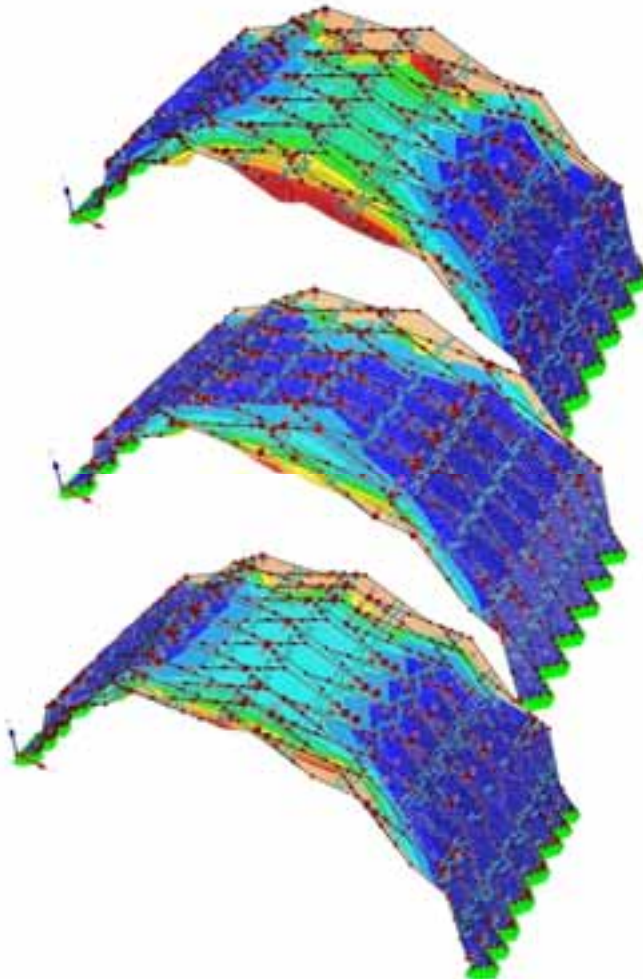
Gilles Gouaty, Ivo Stotz, Johannes Natterer

Innovative Timber Constructions
Yves Weinand

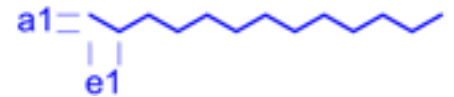
Internal forces



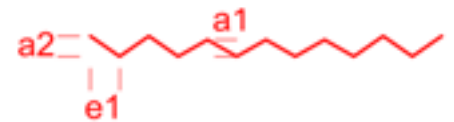
Deformations



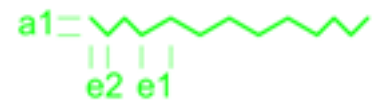
1. Max vectorial displacement 3.3 mm



2. Max vectorial displacement 2.2 mm



3. Max vectorial displacement 1.9 mm



Hani Buri, Johannes Natterer

Atelier Weinand

Structural Fibres, Autumn 2007



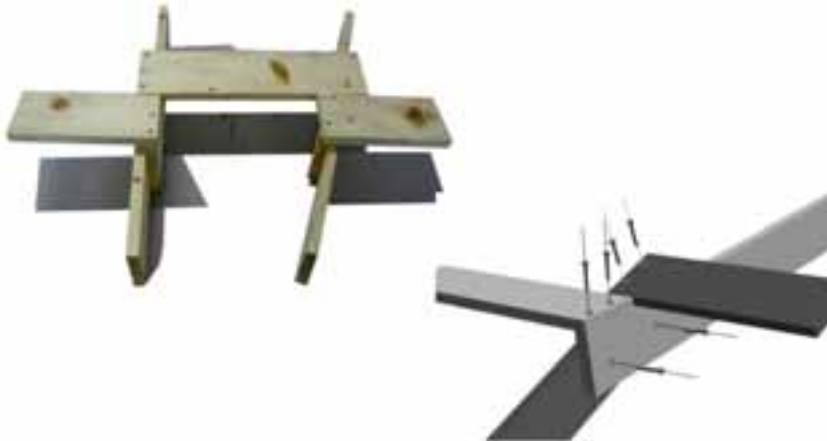
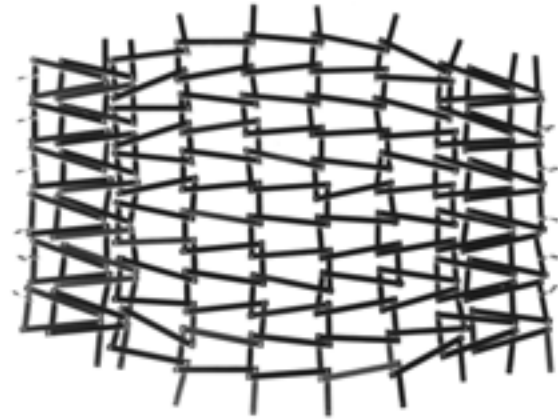
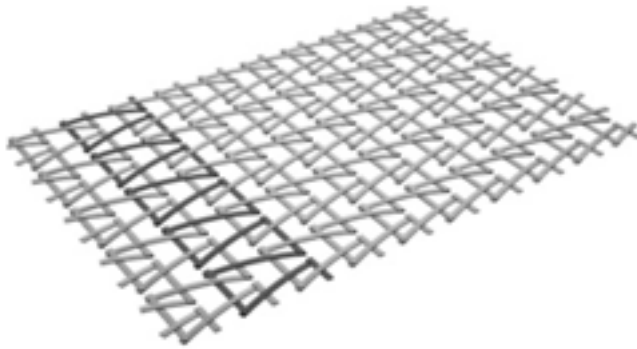
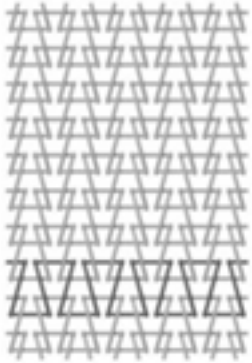
Research & Teaching

Practical implementation of knowledge



Atelier Weinand Autumn 07 Prof. Yves Weinand, Hani Buri, Markus Hudert
Students Pietro Ramondo , Jacopo Laffranchini

Innovative Timber Constructions
Yves Weinand

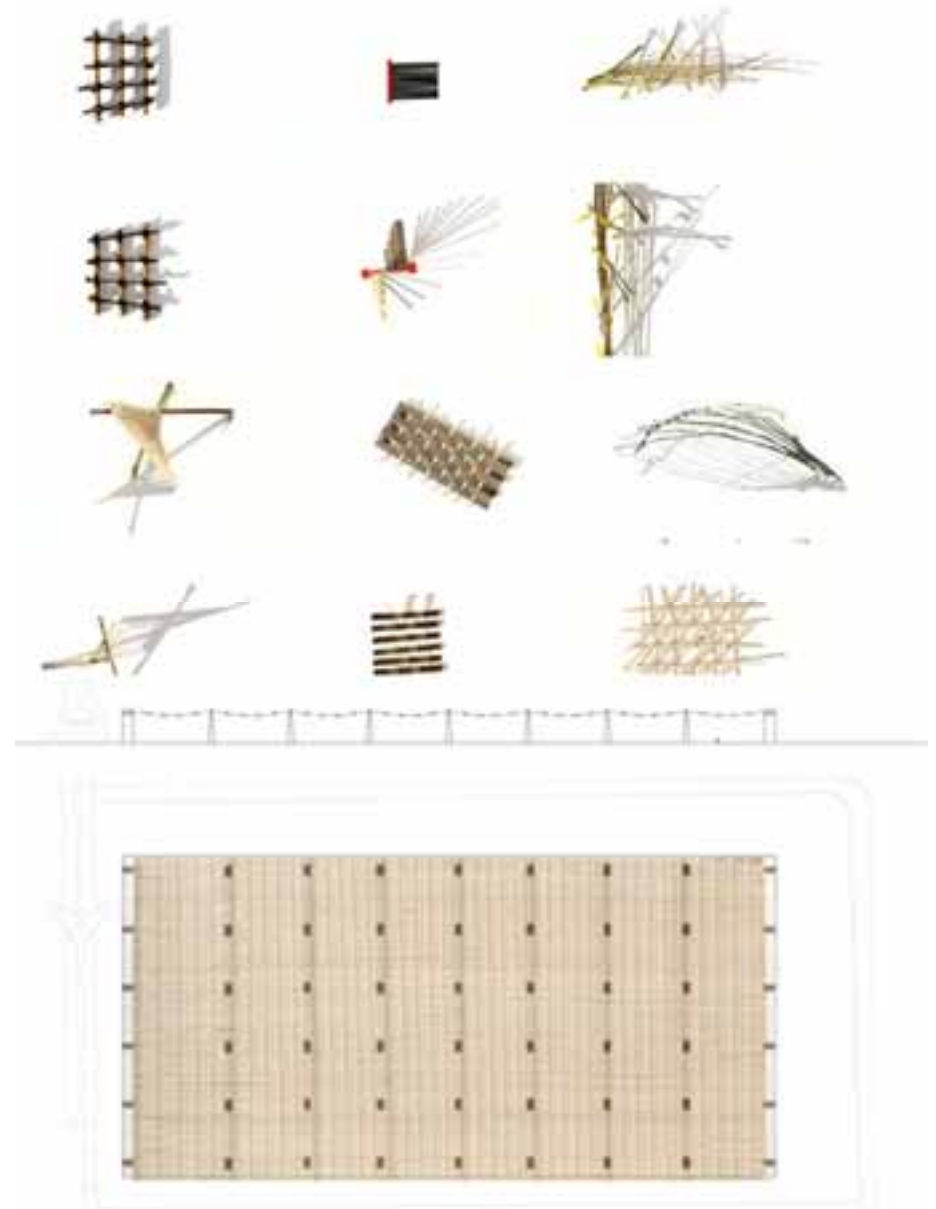
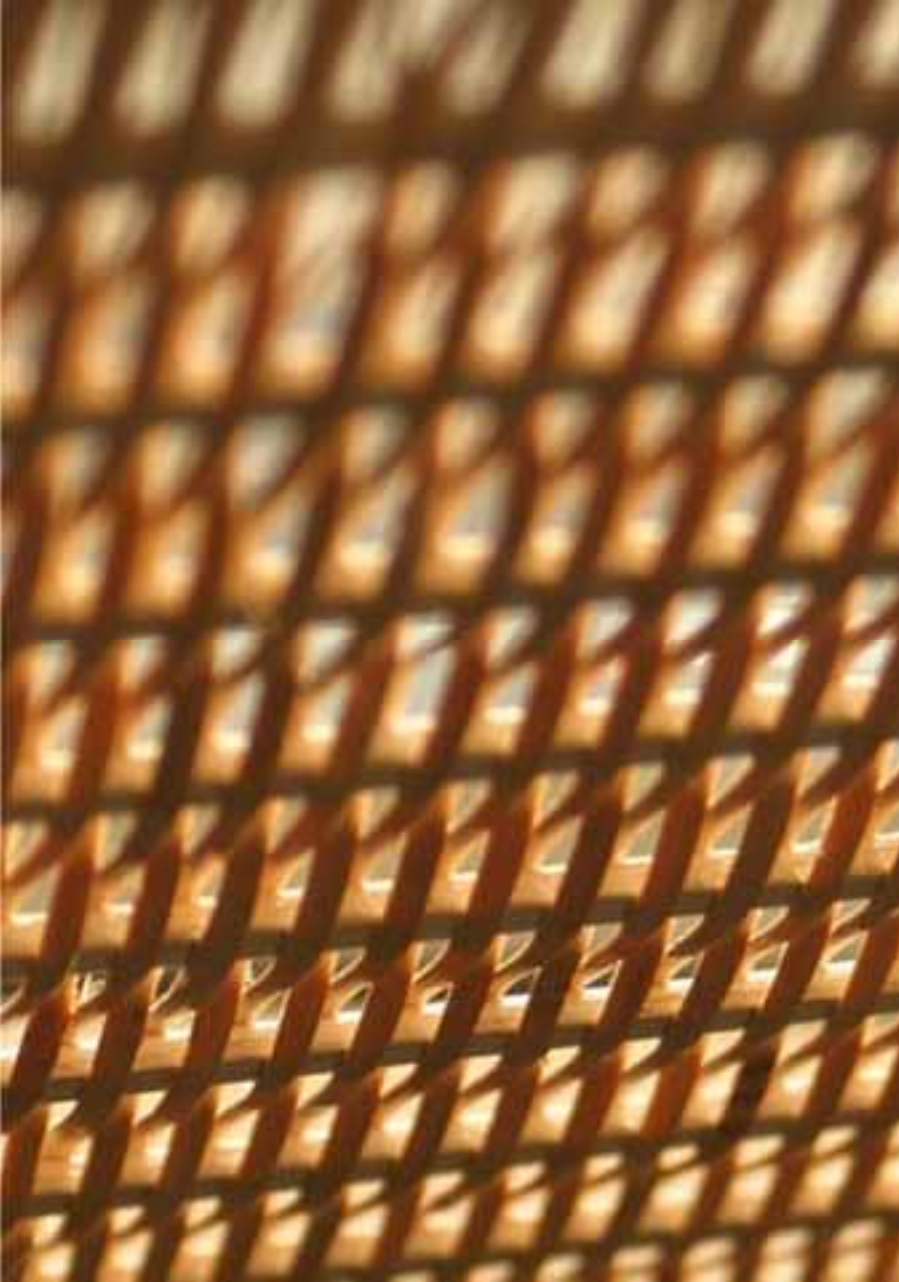


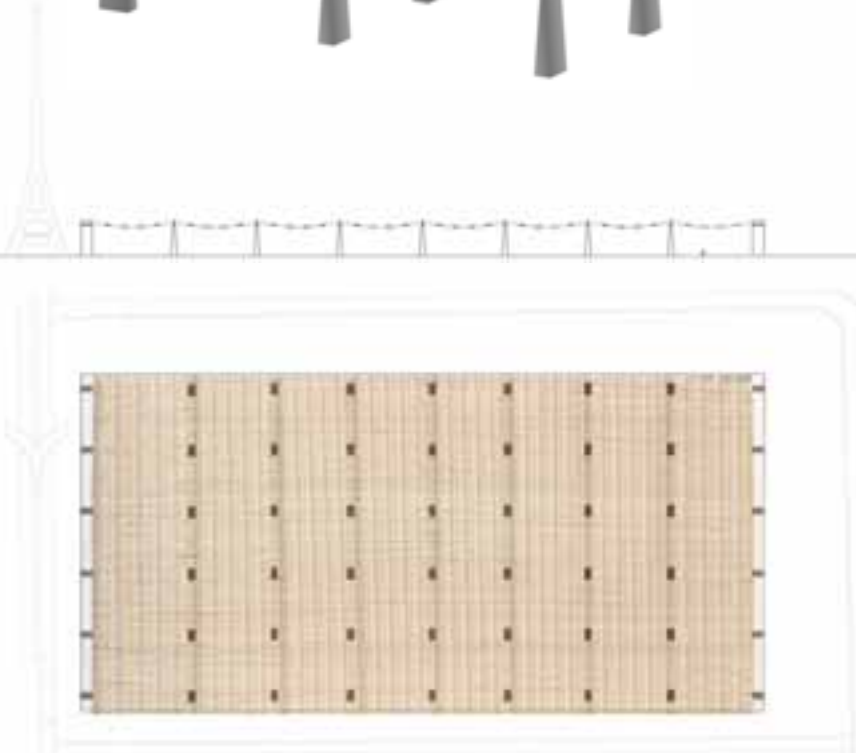
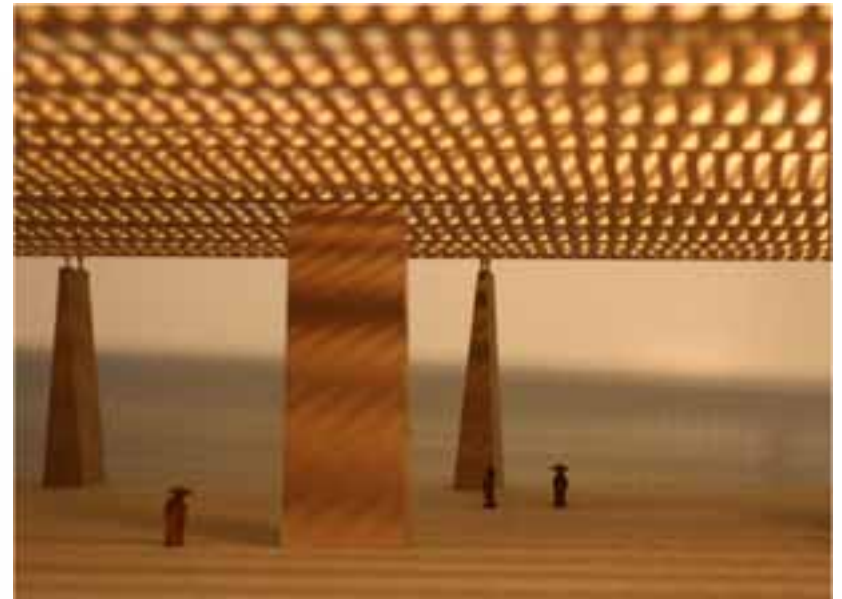
Atelier Weinand Spring 08 Prof. Yves Weinand, Hani Buri, Markus Hudert
Student Thomas Austerveil



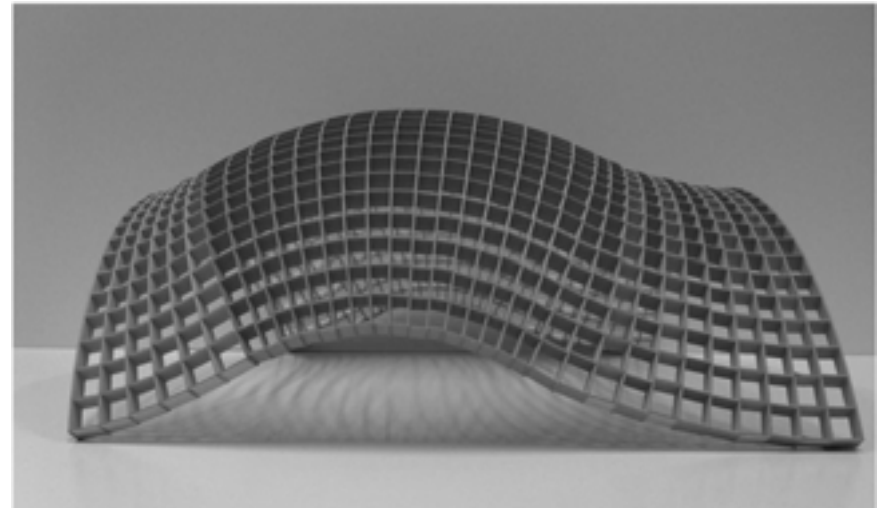
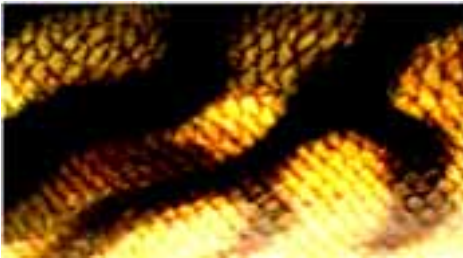
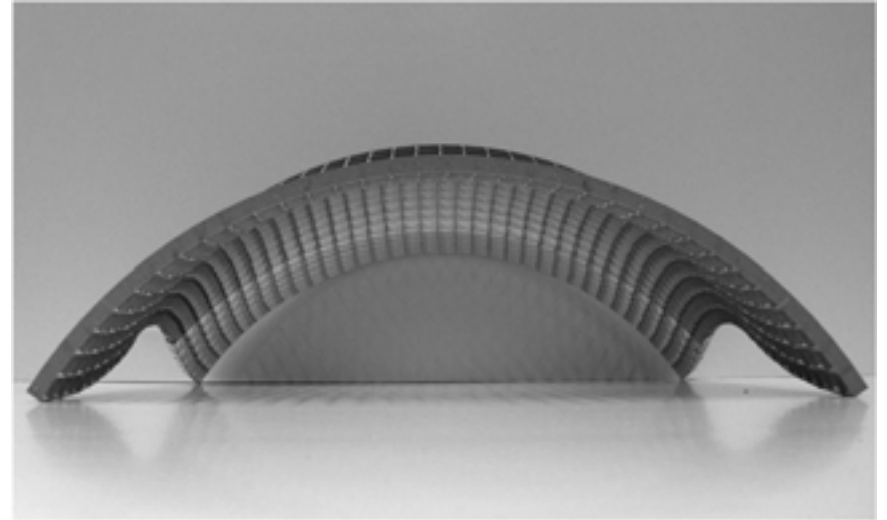
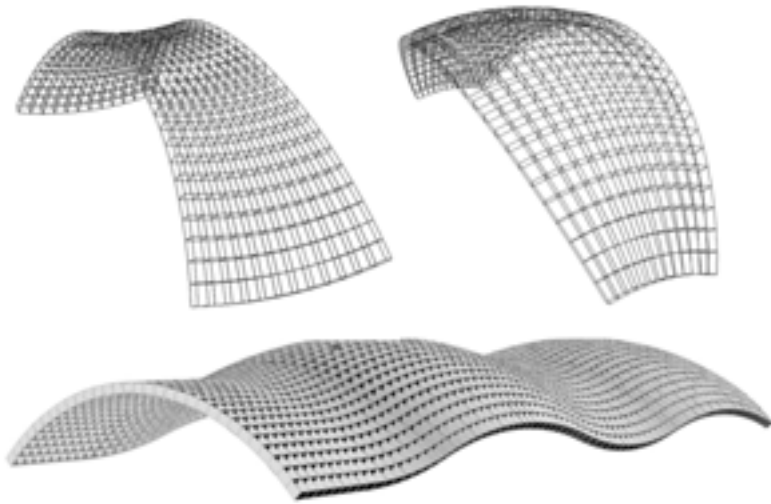
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Student Jacopo Laffranchini







Atelier Weinand Spring 07 Prof. Yves Weinand, Hani Buri, Ivo Stotz
 Student Sophie Carpentieri



Atelier Weinand Autumn 06 Prof. Yves Weinand, Hani Buri, Ivo Stotz
Student Celine Kobel

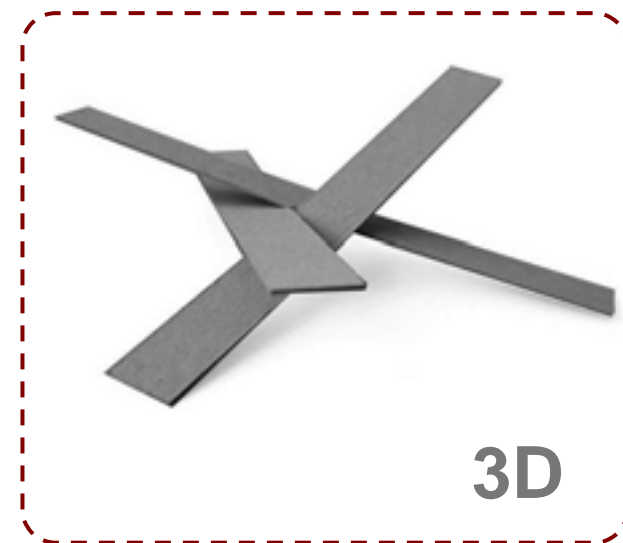


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Student Magdalena Besomi

Innovative Timber Constructions
Yves Weinand



2D



3D

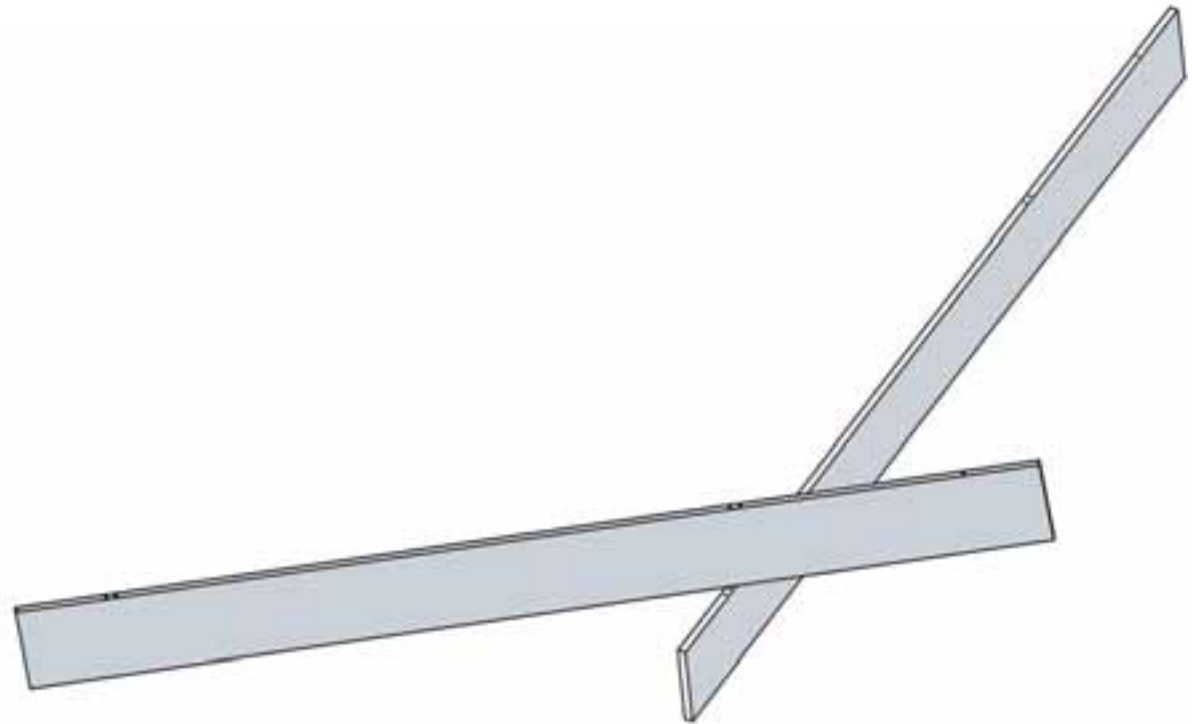


Atelier Weinand Autumn 09 Prof. Yves Weinand, Fred Hatt, Markus Hudert
Student Magdalena Besomi

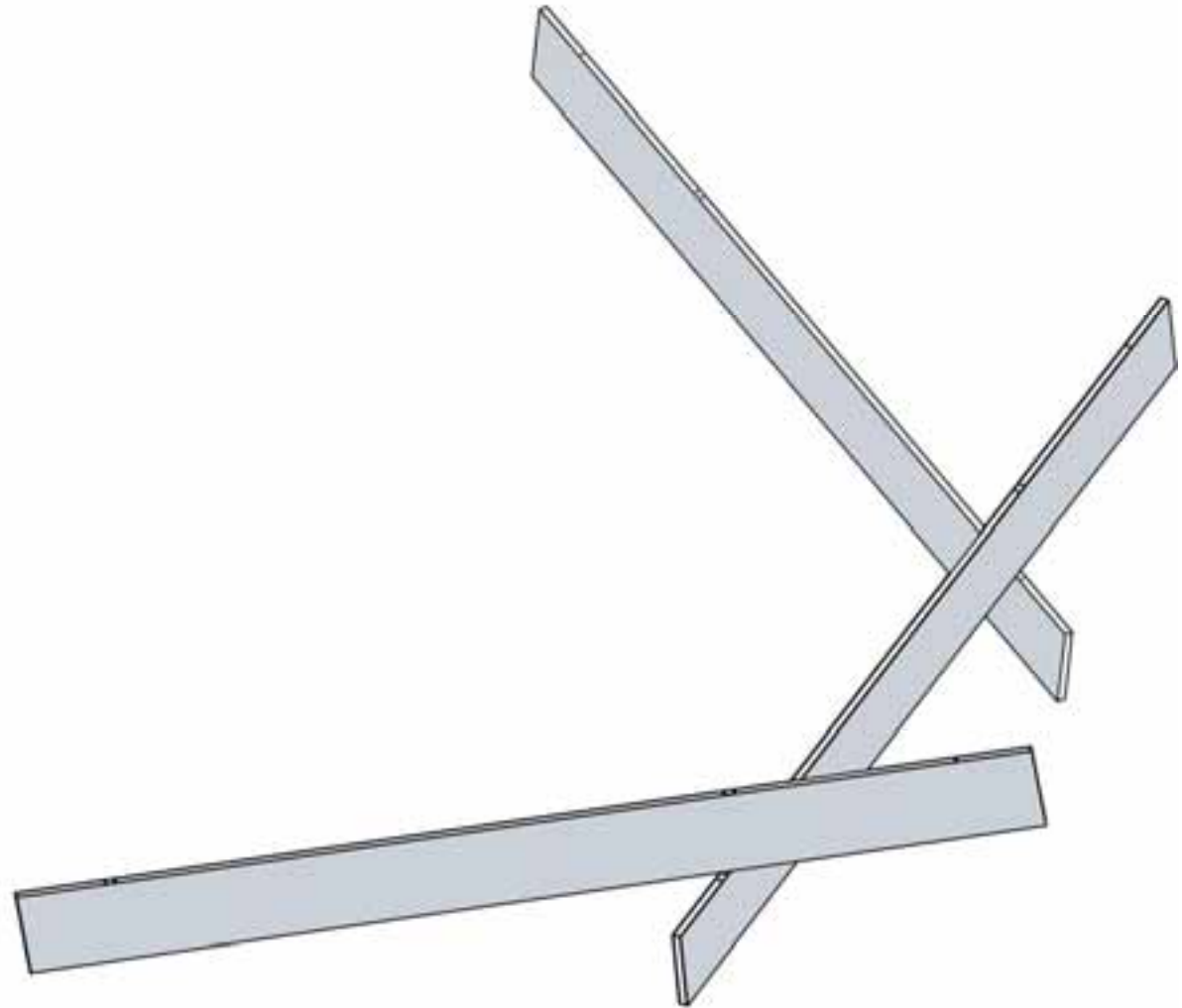
TISSU 1



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Student Magdalena Besomi

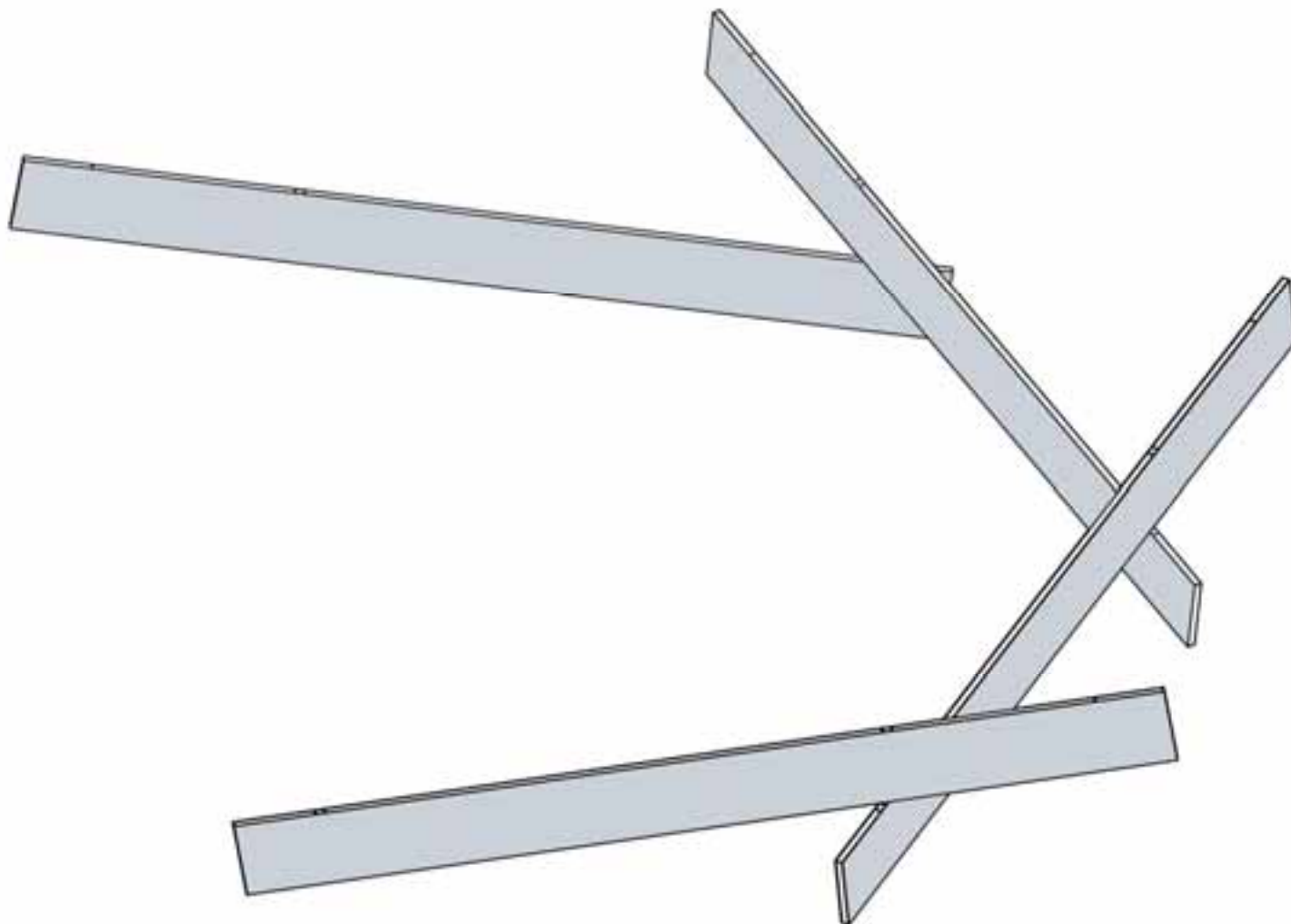


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Student Magdalena Besomi



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Student Magdalena Besomi

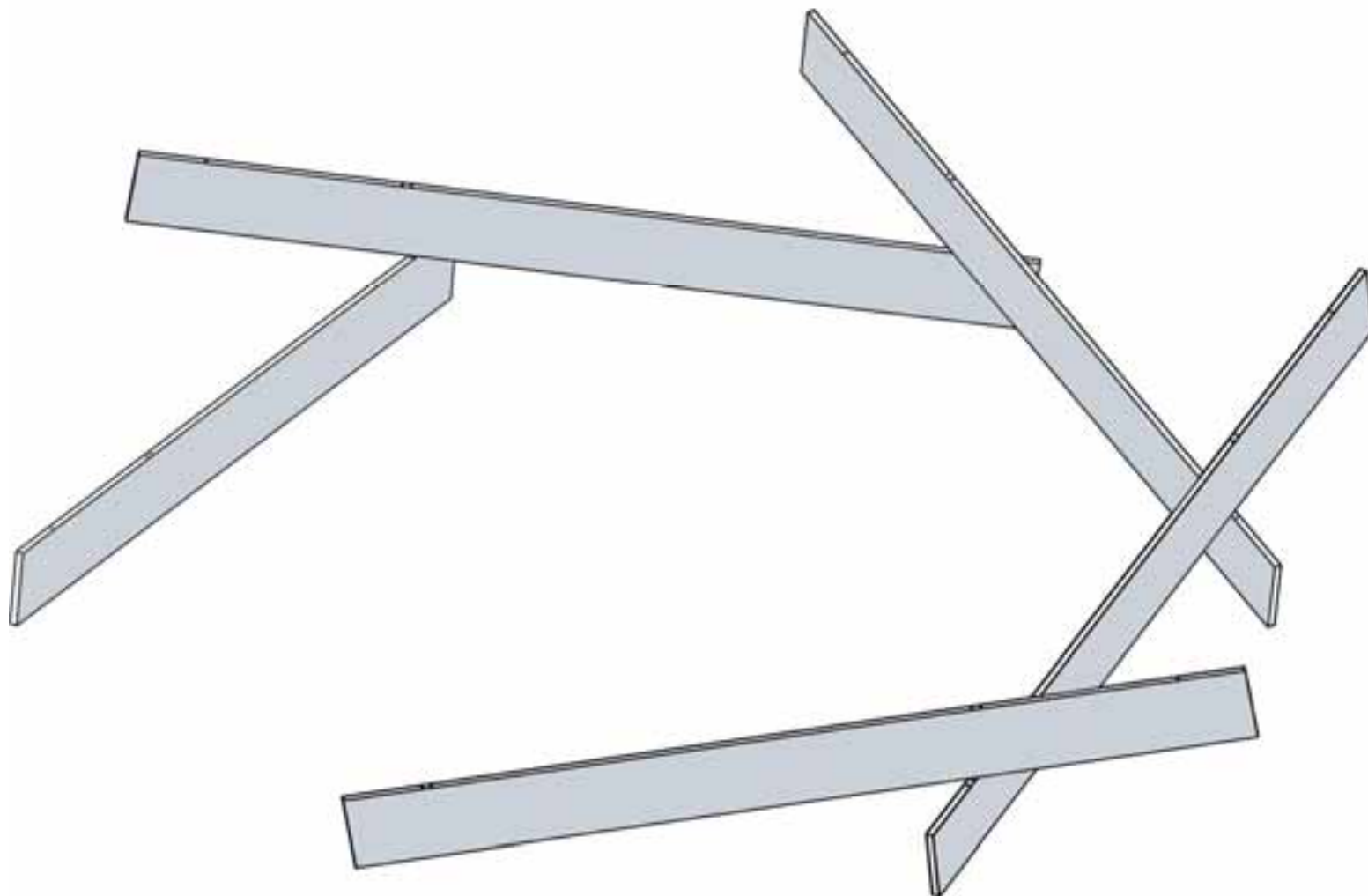
TISSU 1



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Student Magdalena Besomi

Innovative Timber Constructions
Yves Weinand

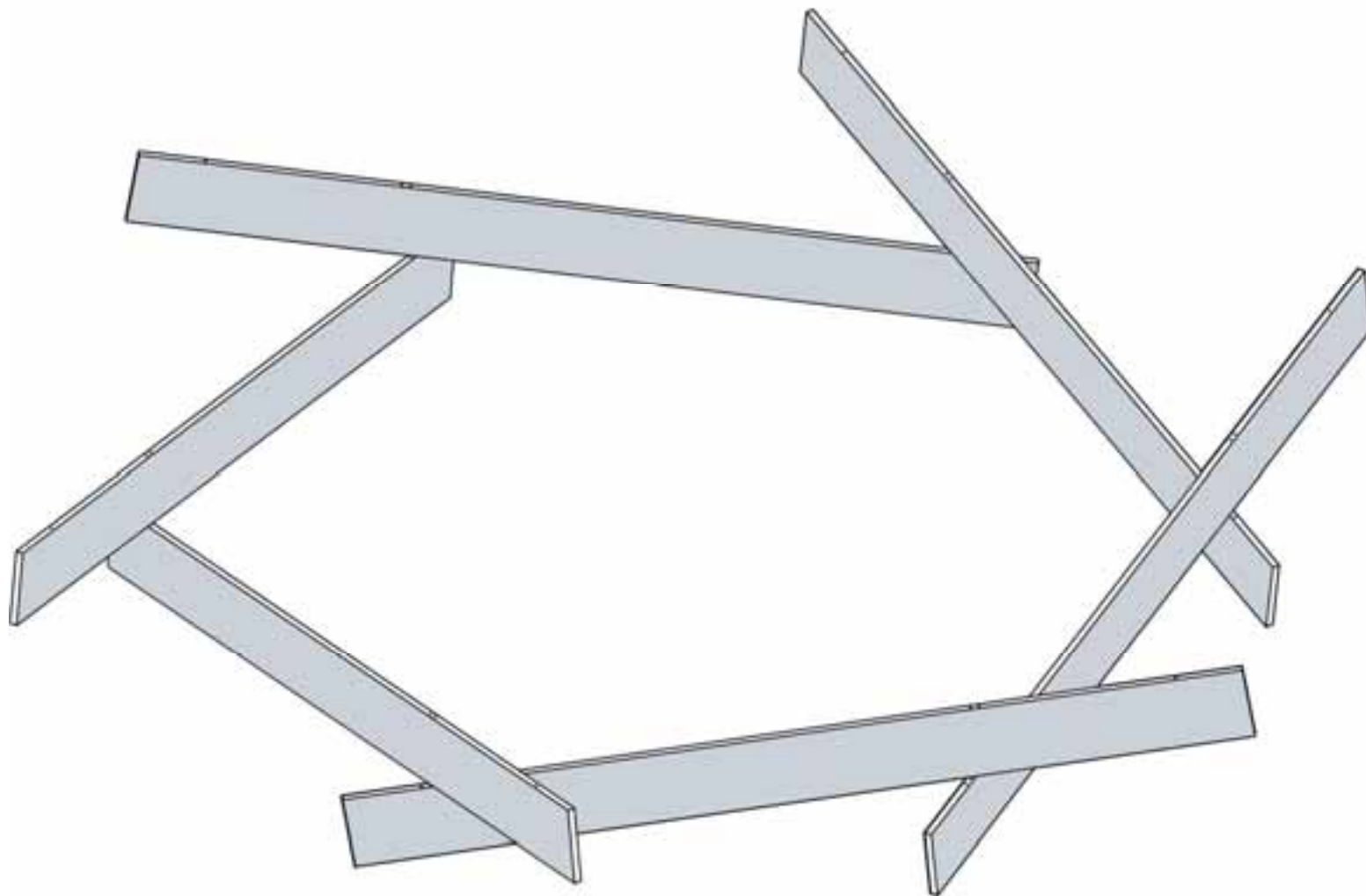
TISSU 1



Atelier Weinand Autumn 09 Prof. Yves Weinand, Fred Hatt, Markus Hudert
Student Magdalena Besomi

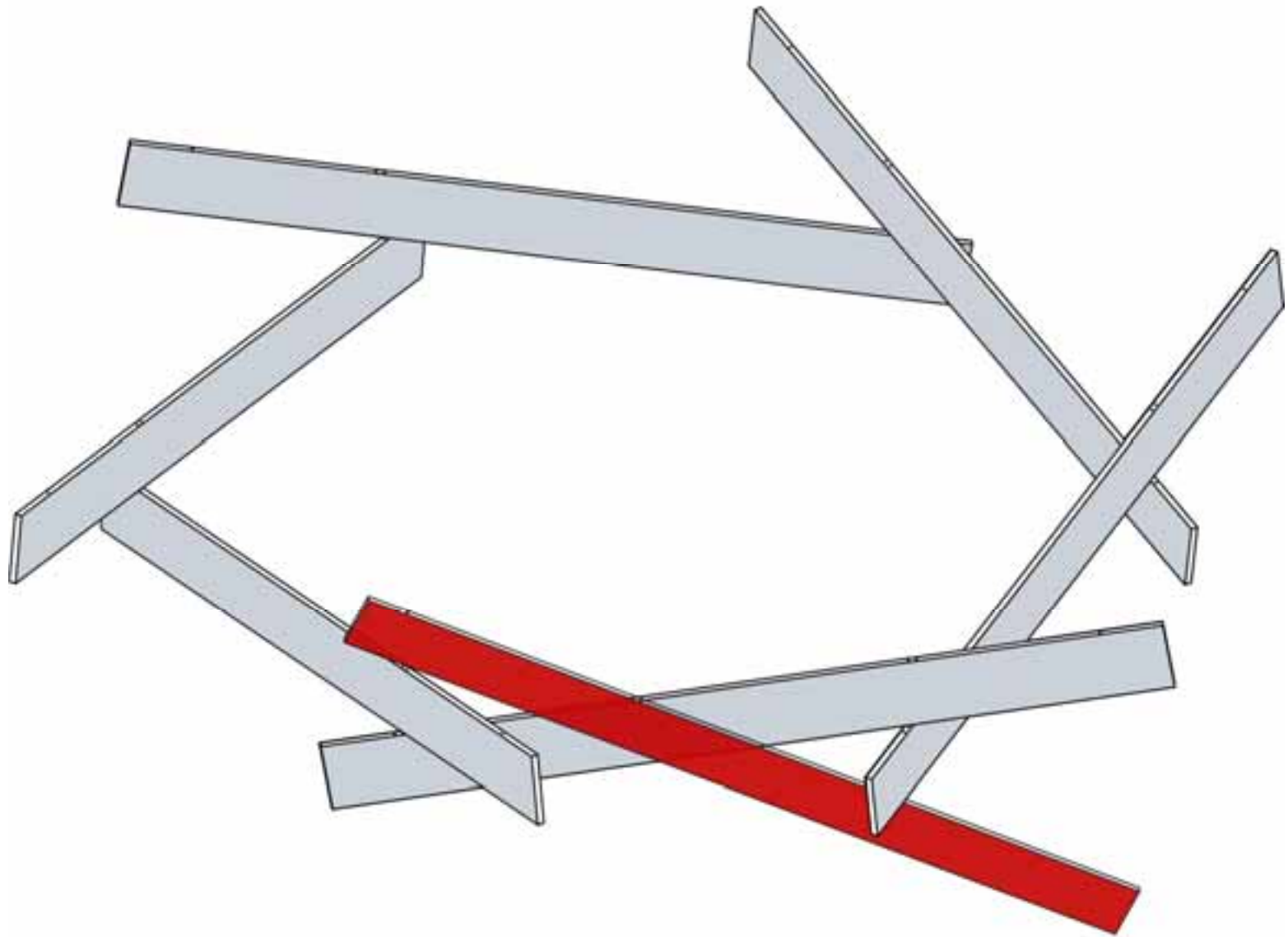
Innovative Timber Constructions
Yves Weinand

TISSU 1

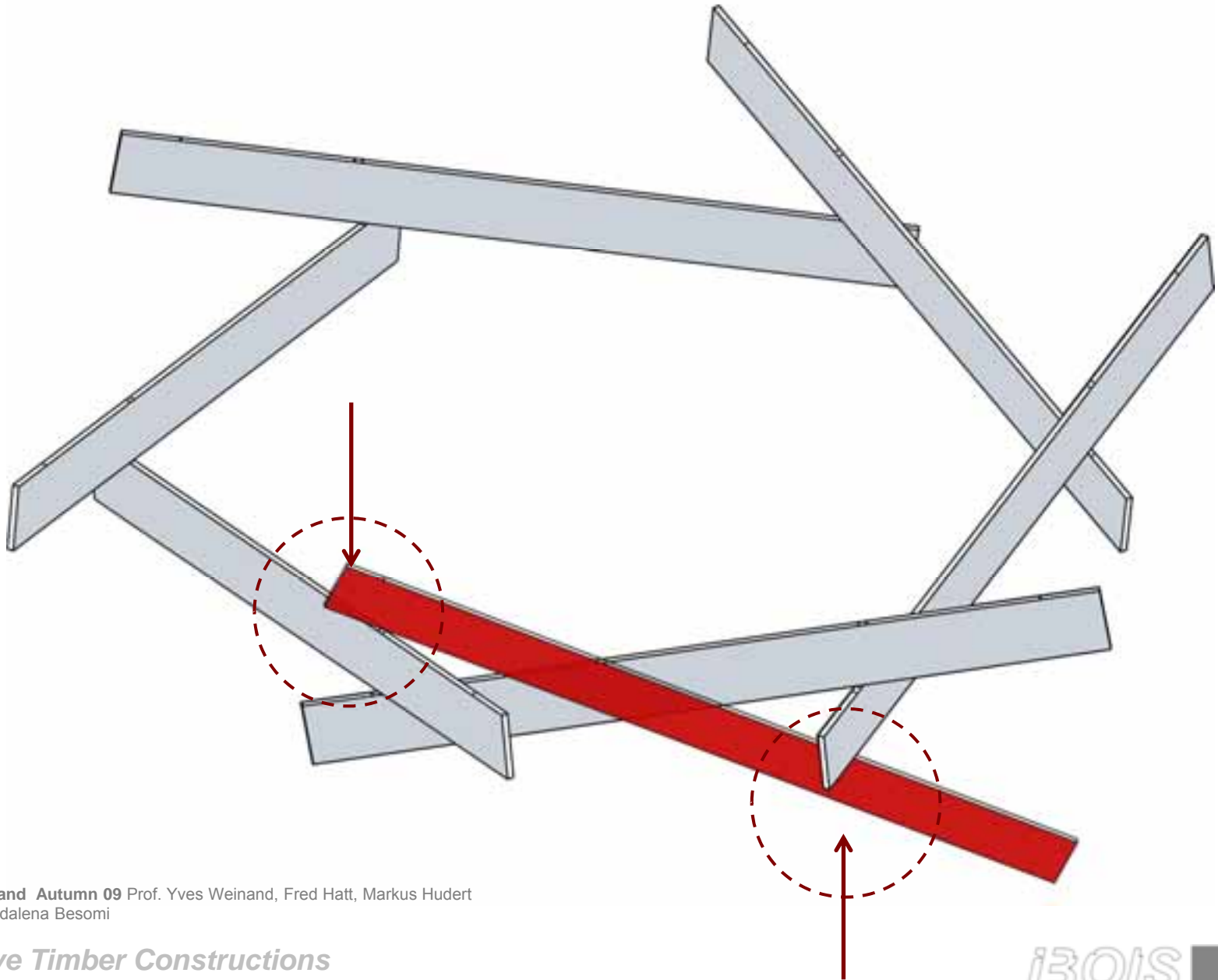


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Student Magdalena Besomi

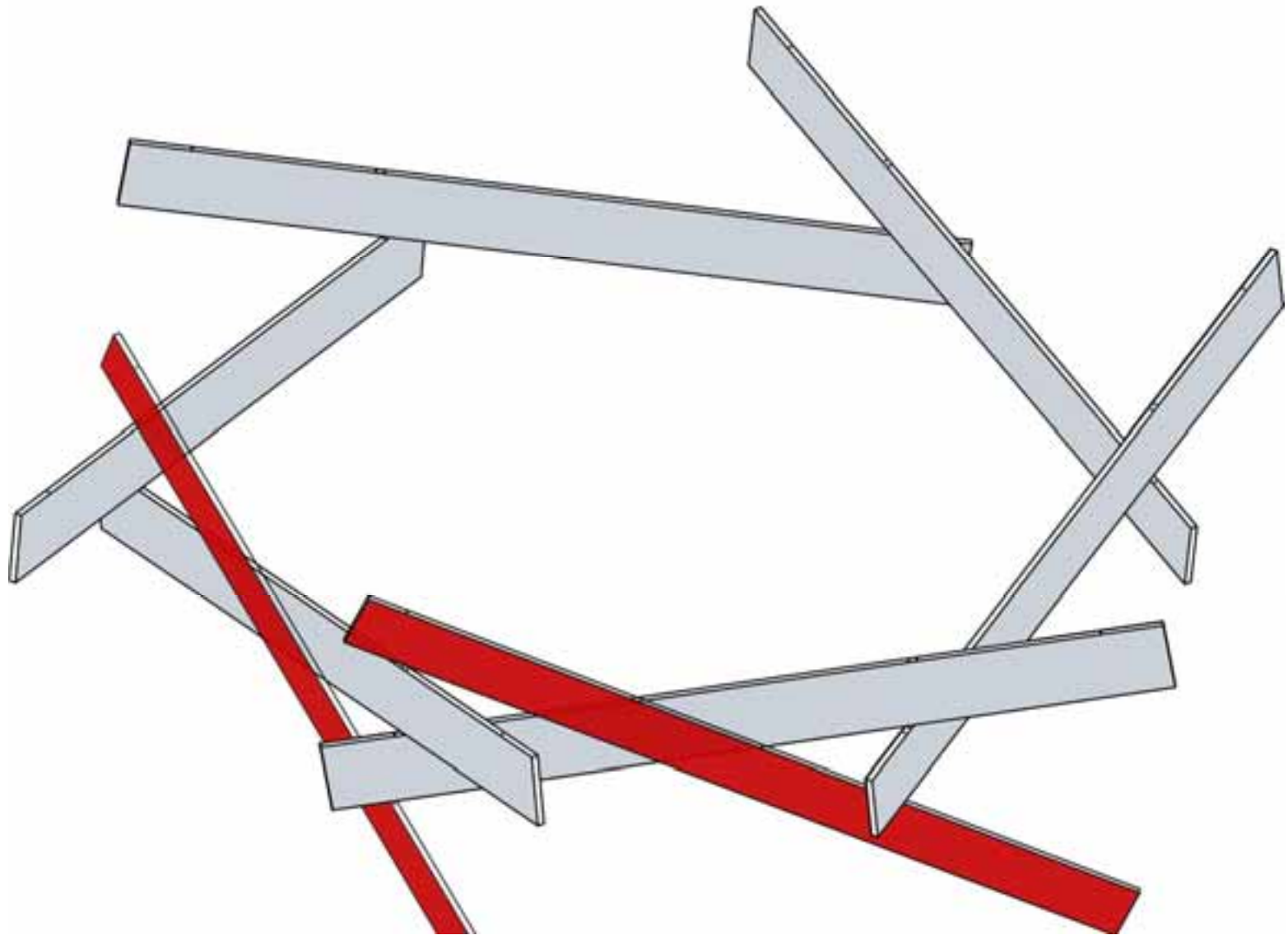
Innovative Timber Constructions
Yves Weinand



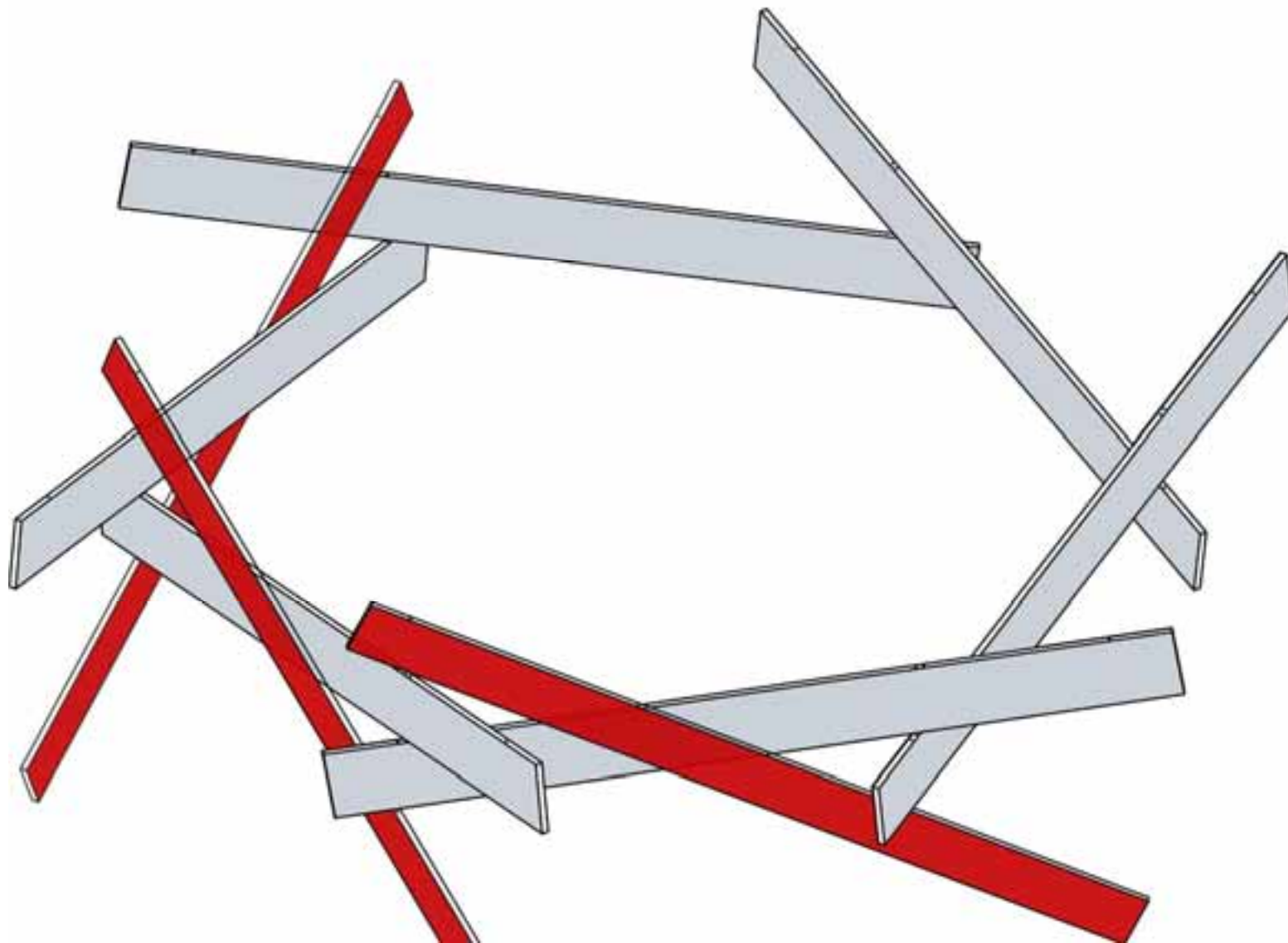
Atelier Weinand Autumn 09 Prof. Yves Weinand, Fred Hatt, Markus Hudert
Student Magdalena Besomi



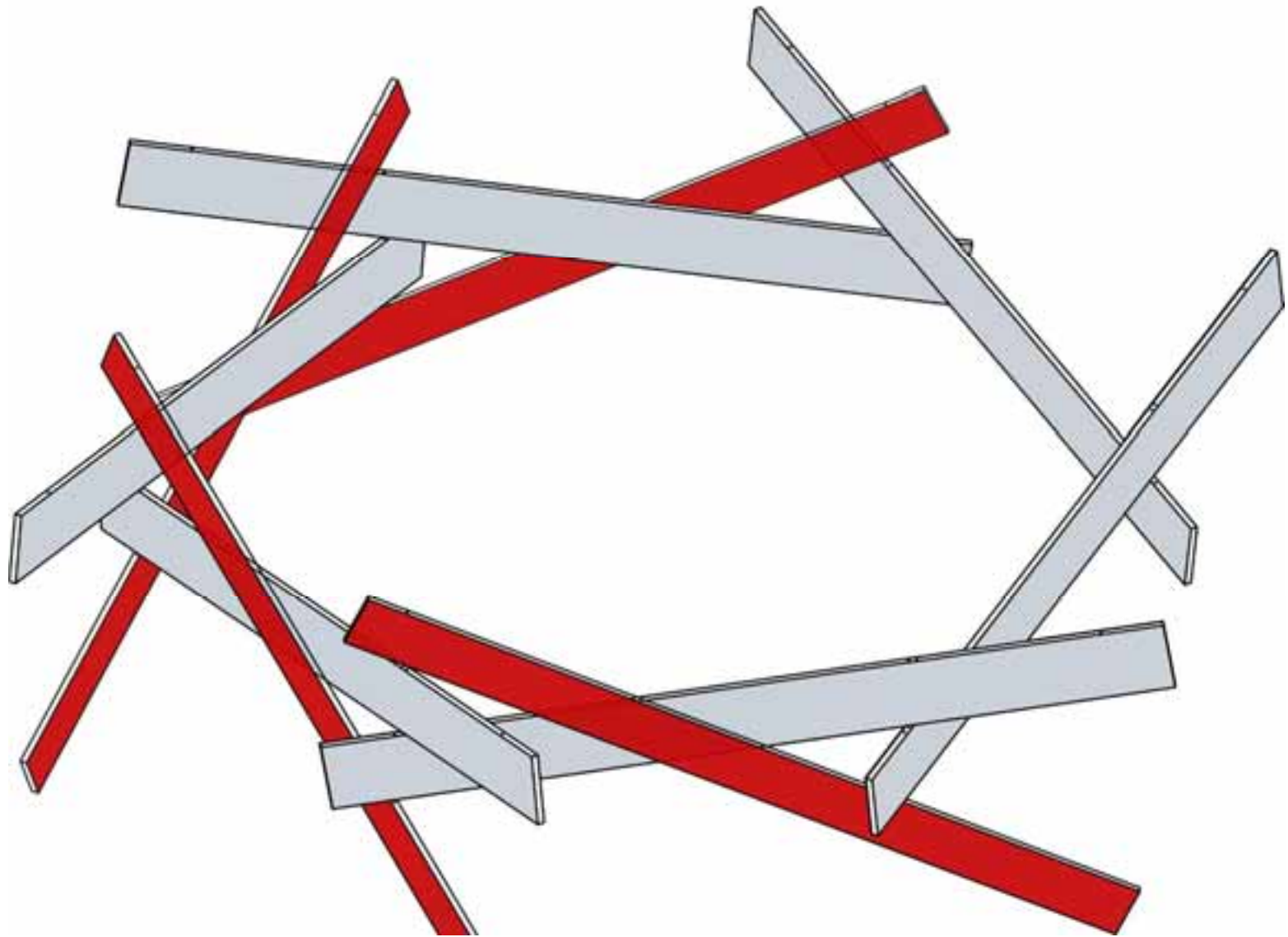
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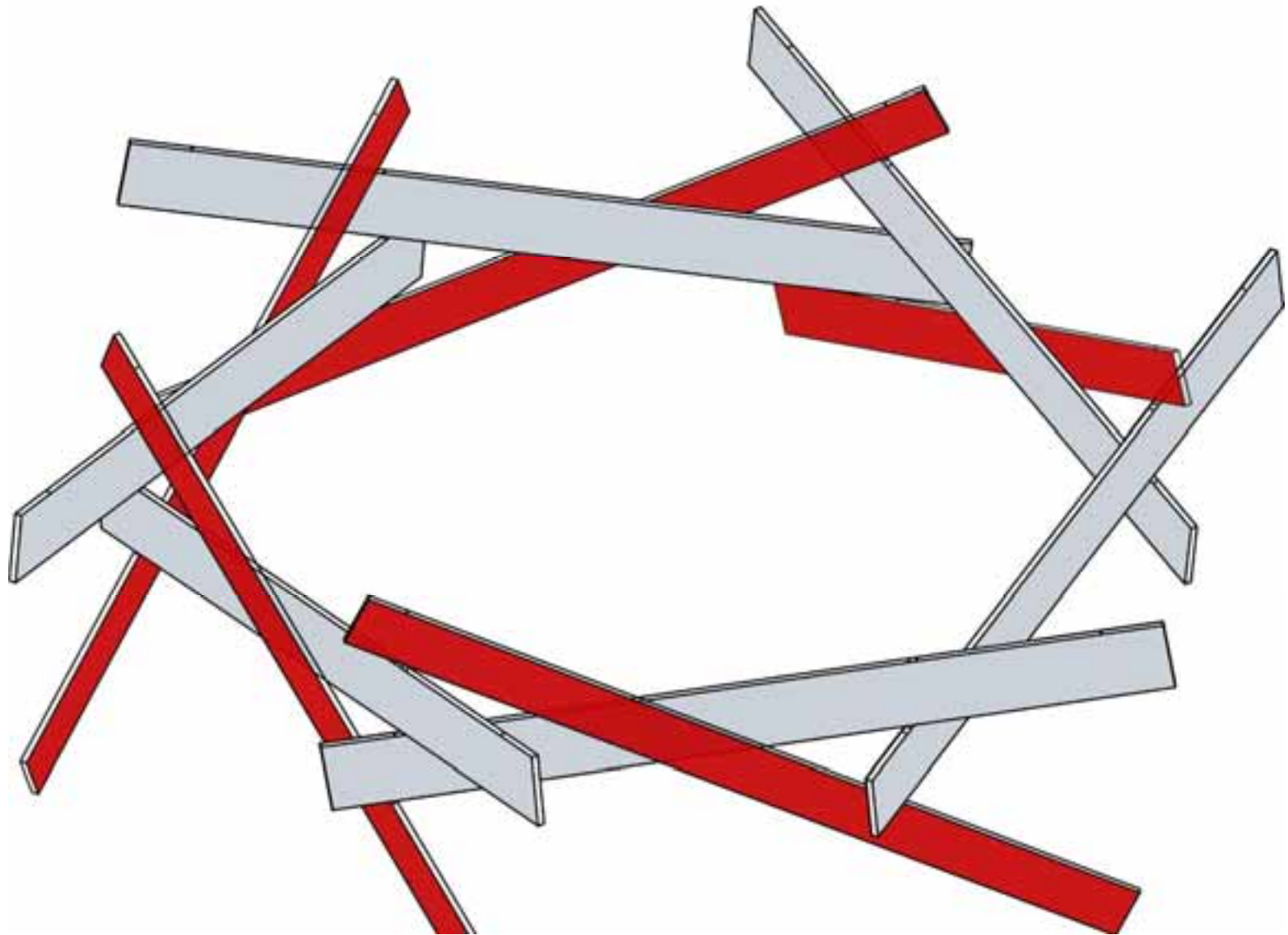
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Student Magdalena Besomi



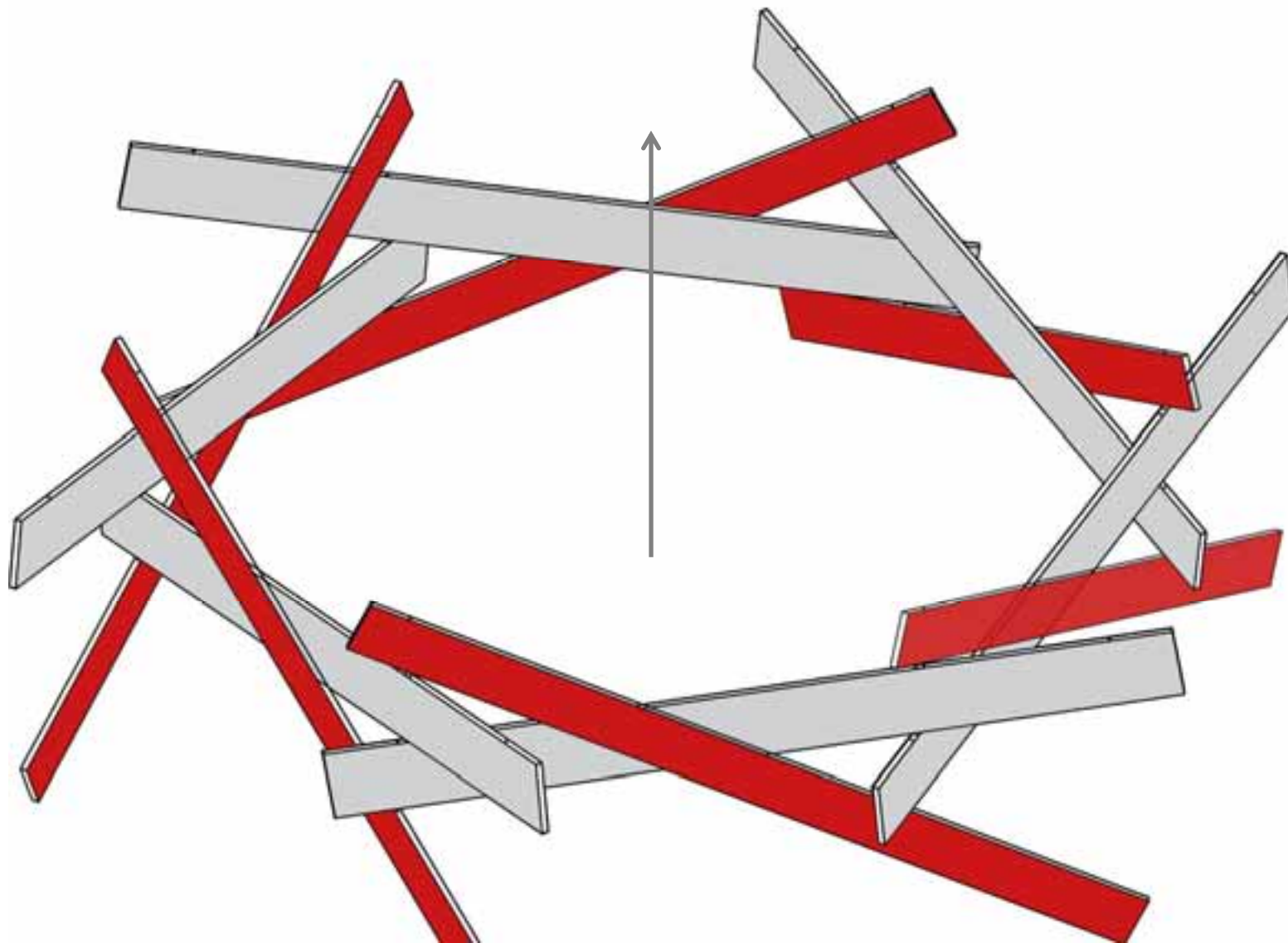
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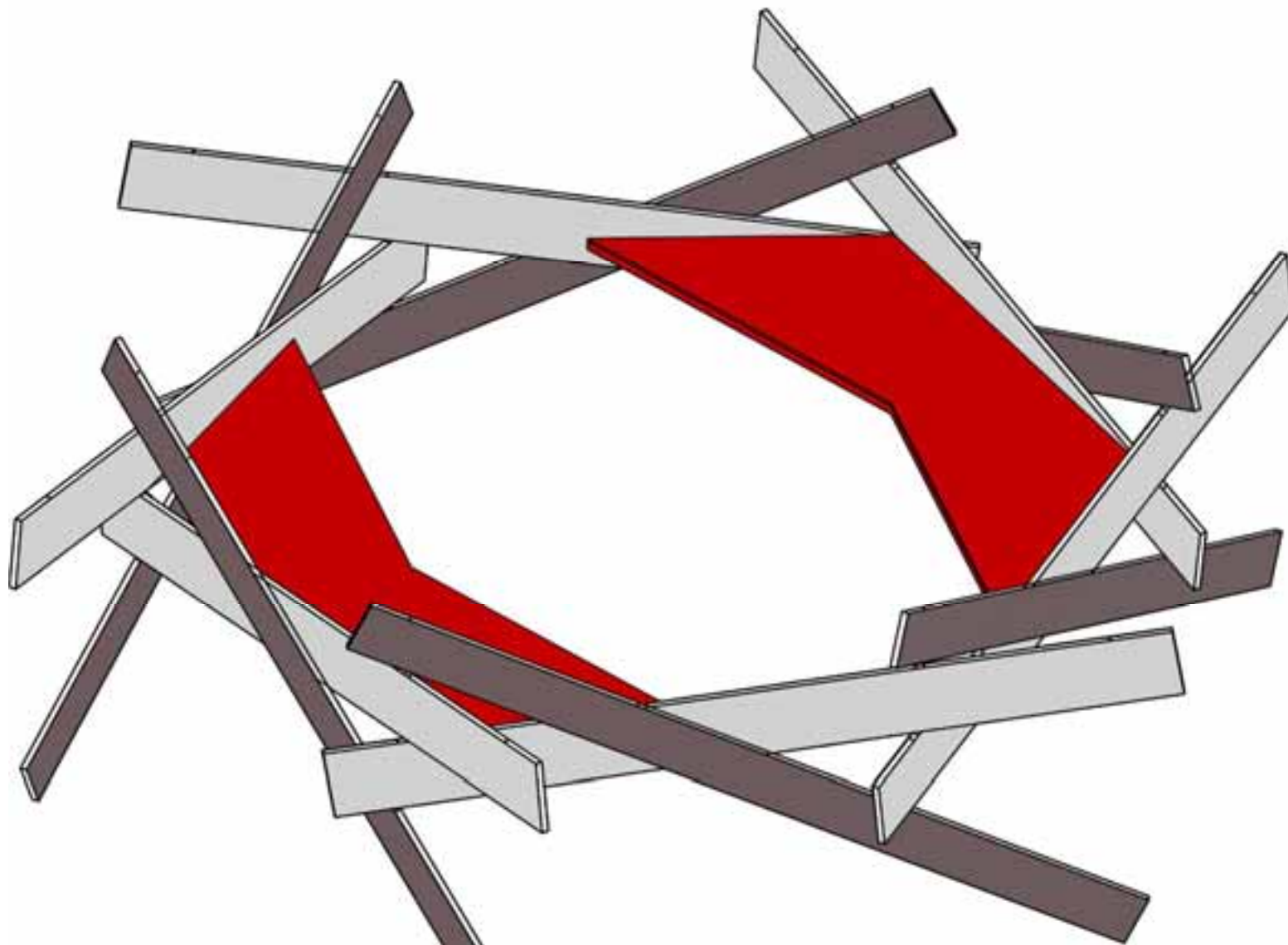


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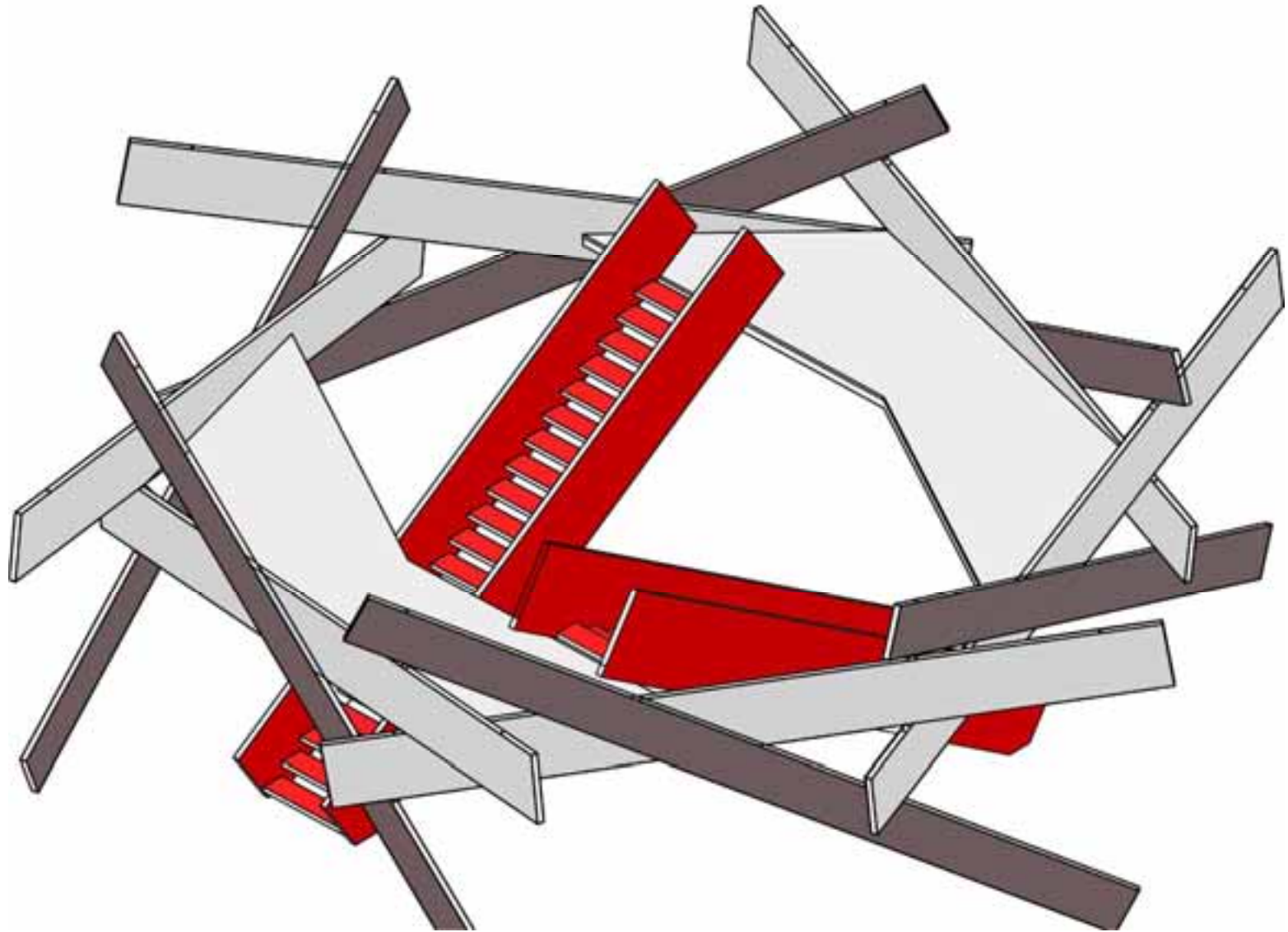
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PALIERS



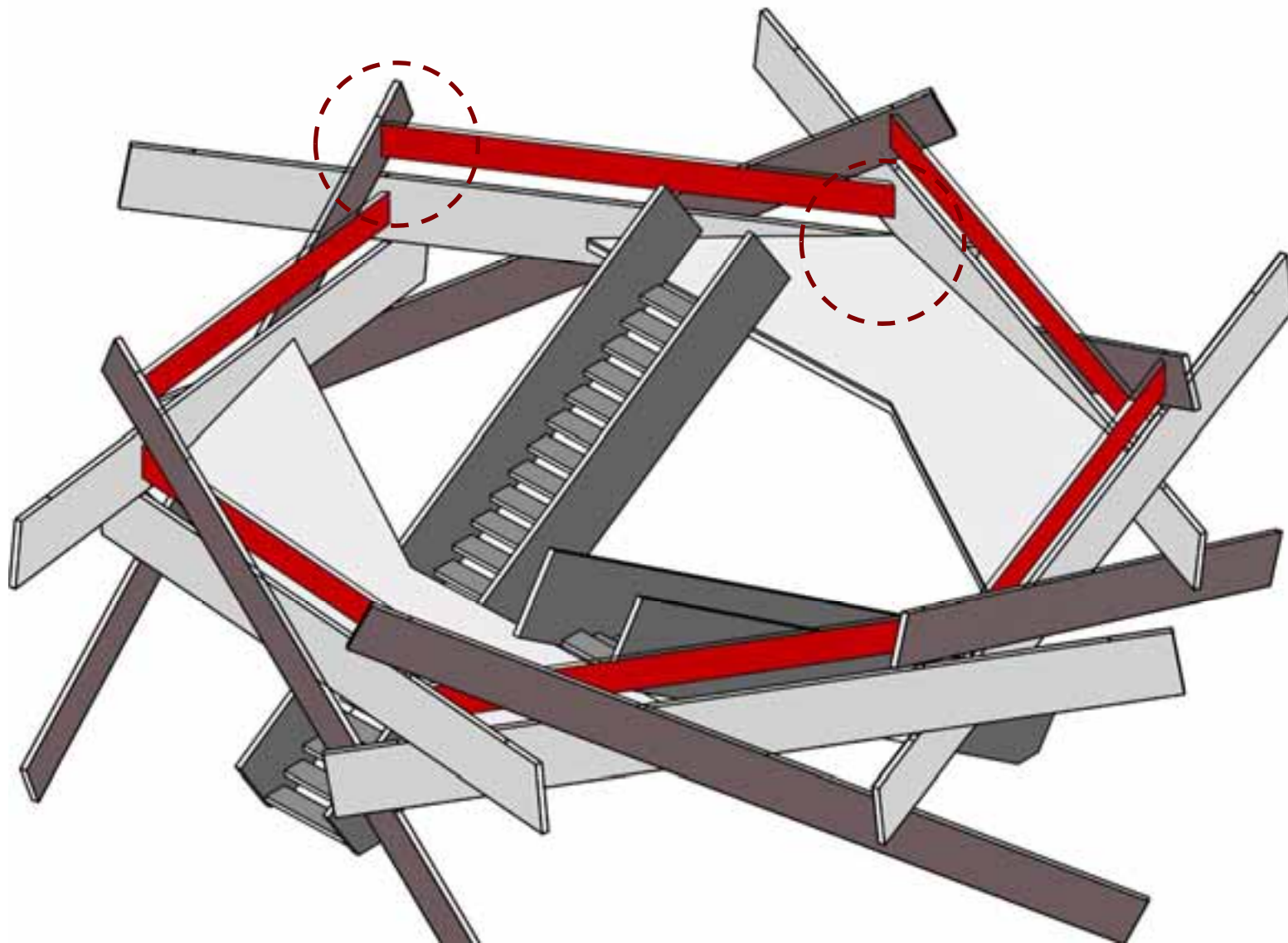
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ESCALIERS

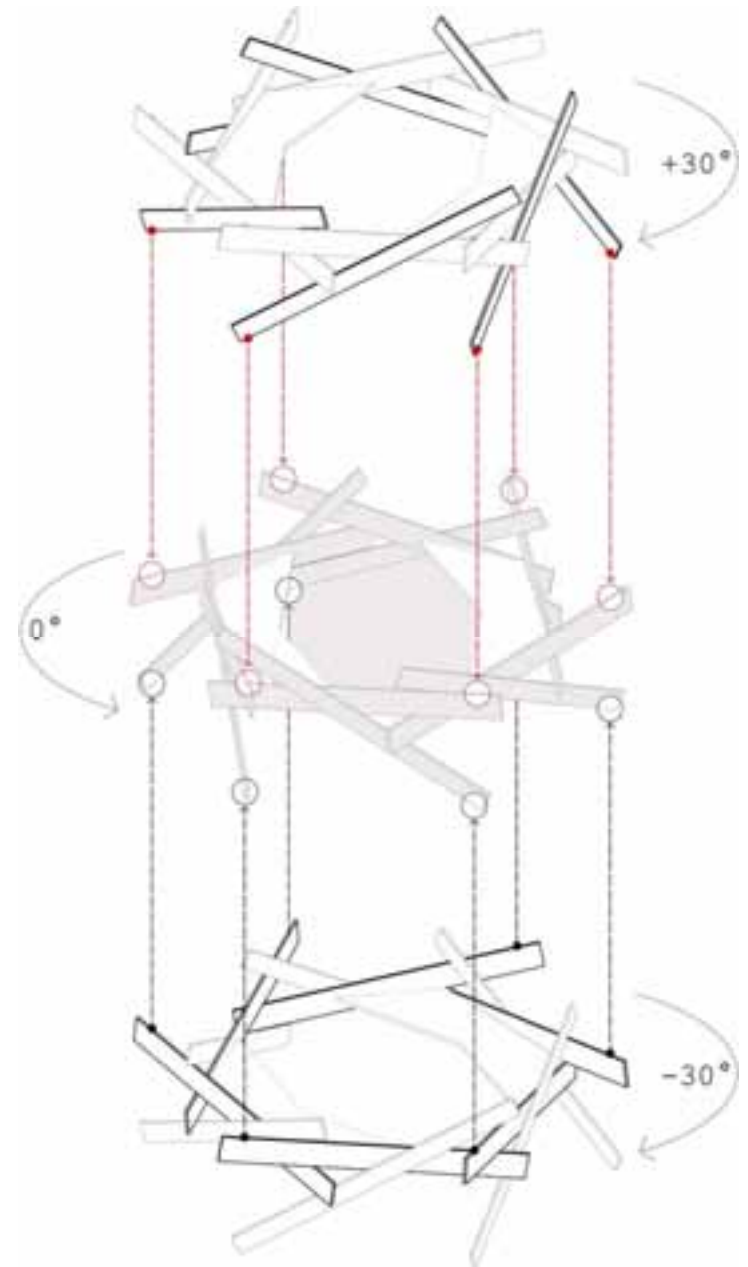


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GARDES-CORPS

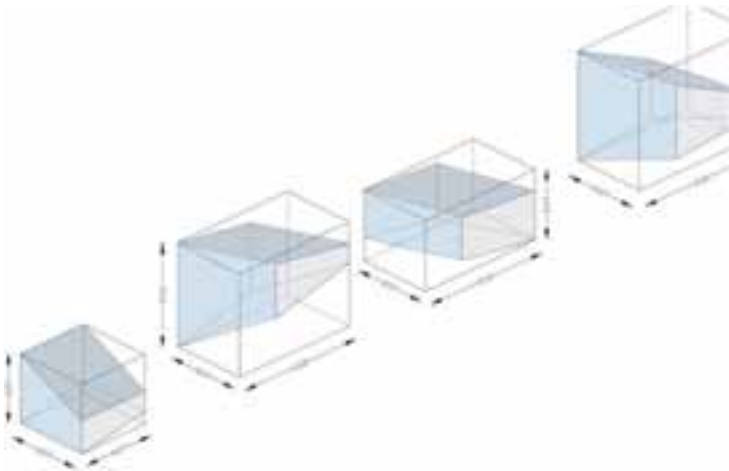


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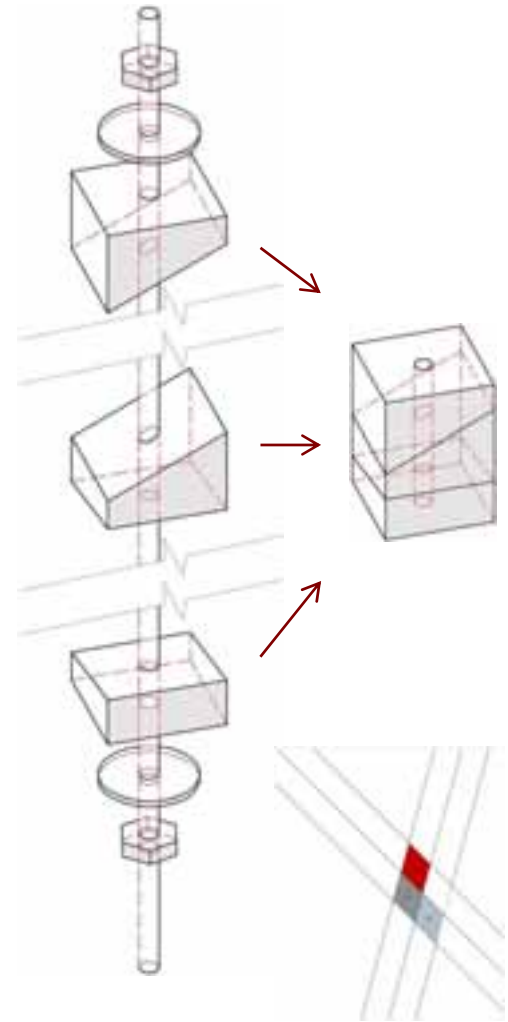
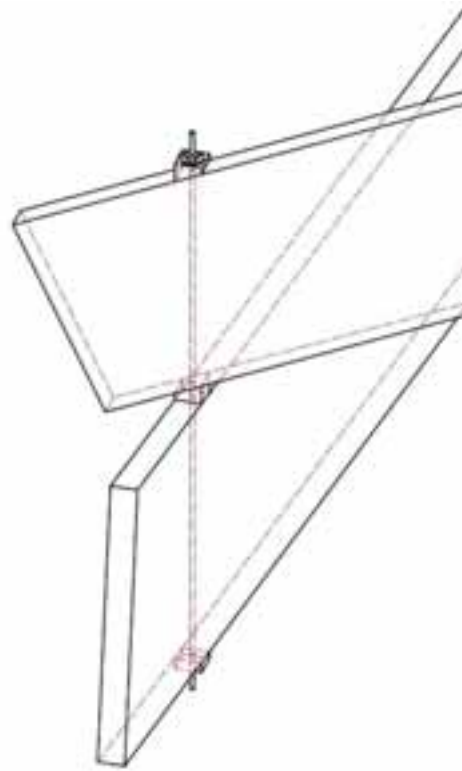


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Innovative Timber Constructions
Yves Weinand

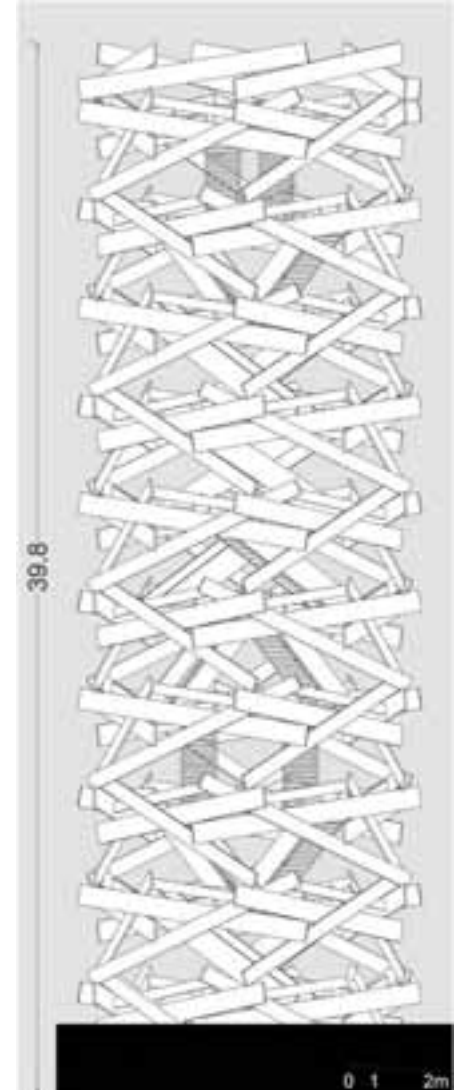
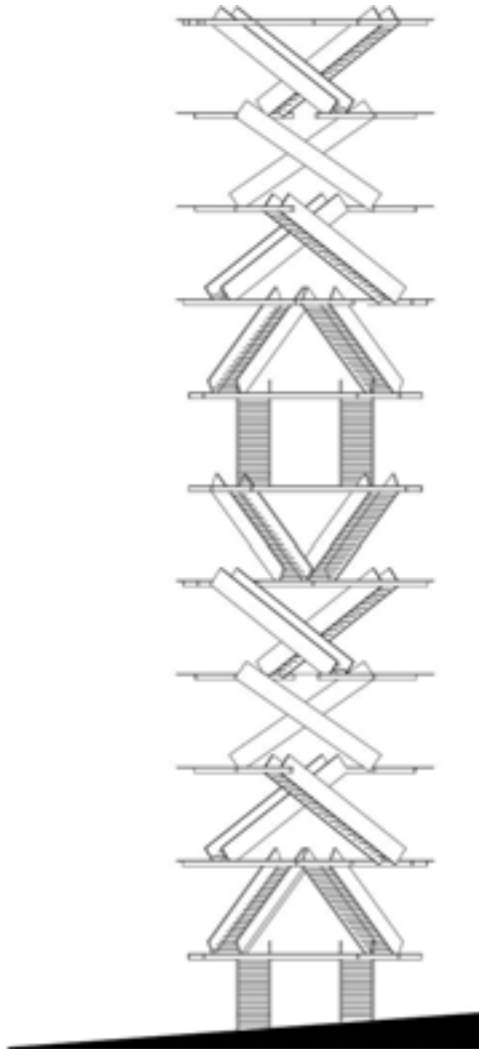


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tissage



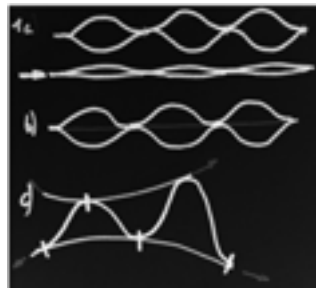
module



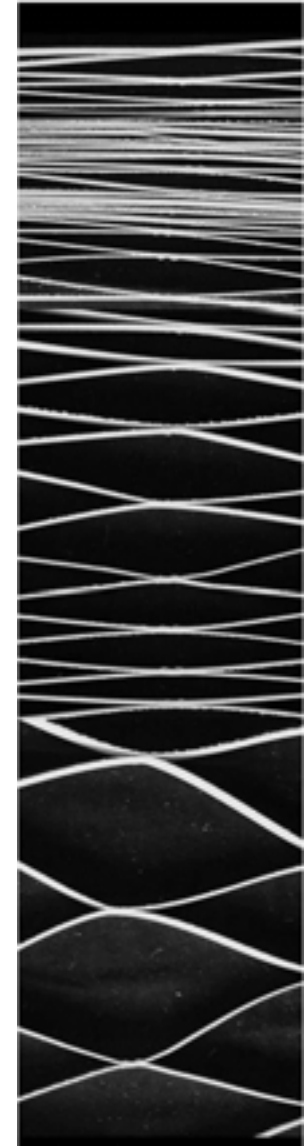
pattern



géométrie

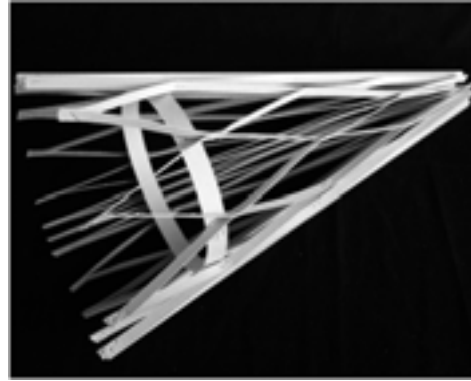
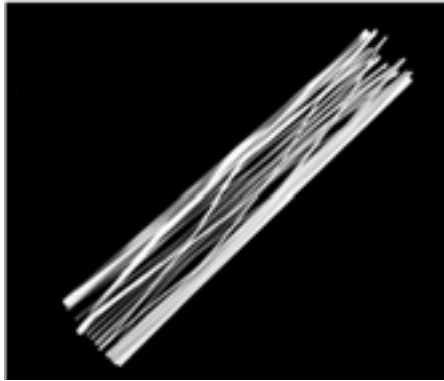


structure

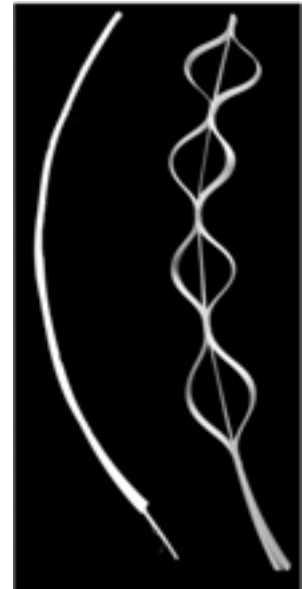
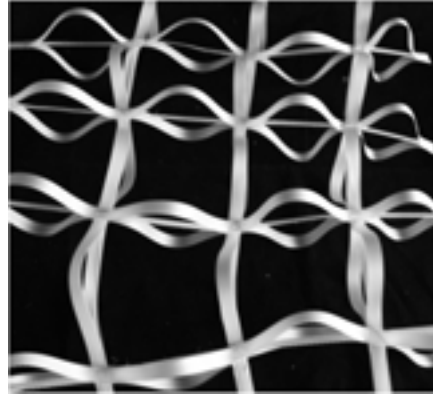
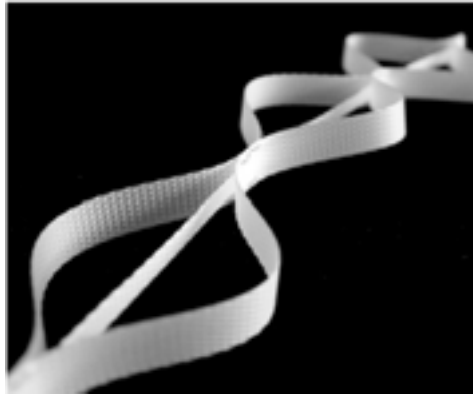


potentiel

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Student Steve Cherpillod

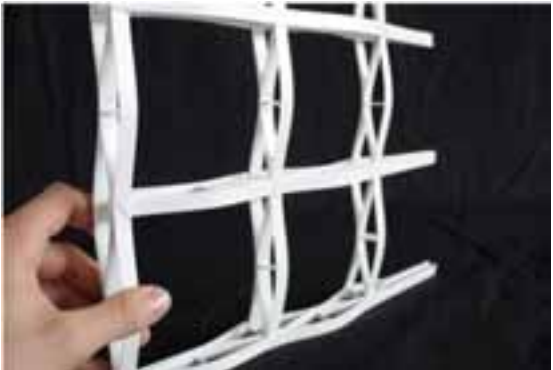
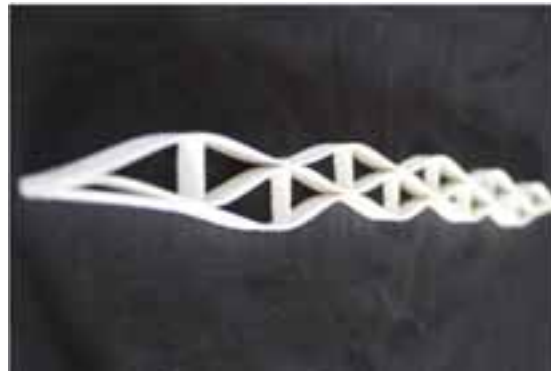


essai 01



essai 02

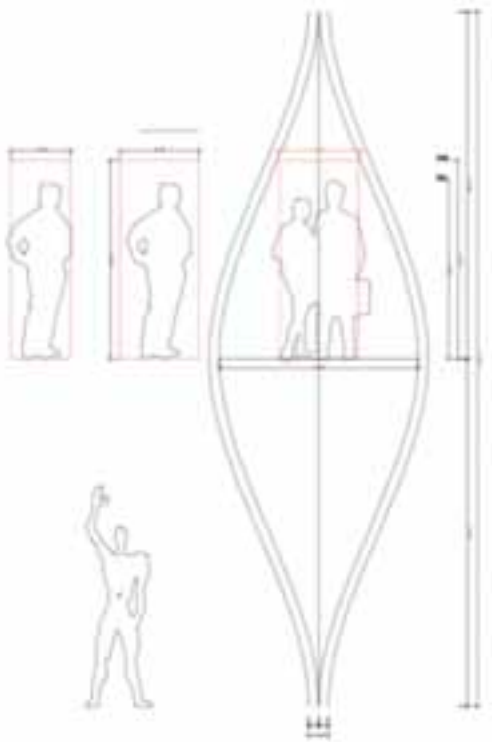
Atelier Weinand Autumn 09 Prof. Yves Weinand, Fred Hatt, Markus Hudert
Student Steve Cherpillod



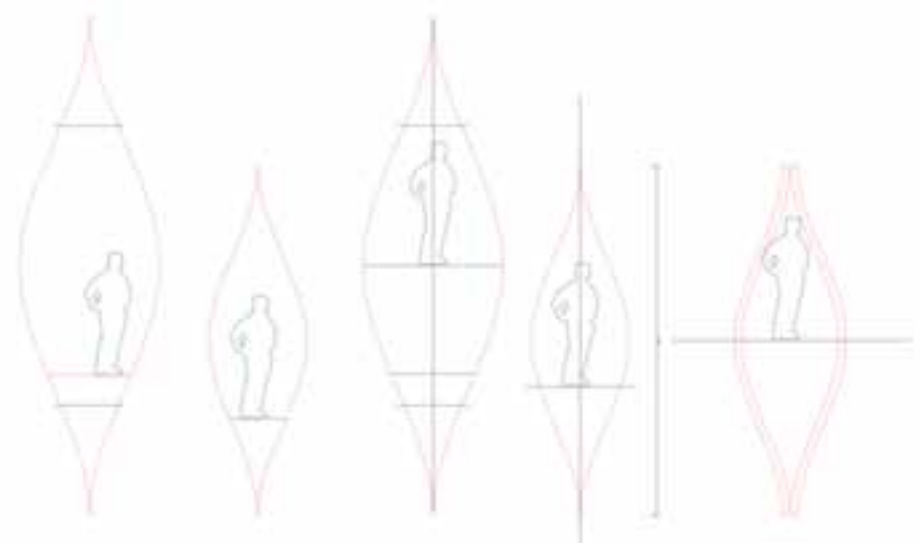
variantes d'utilisations du module

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échelle du module

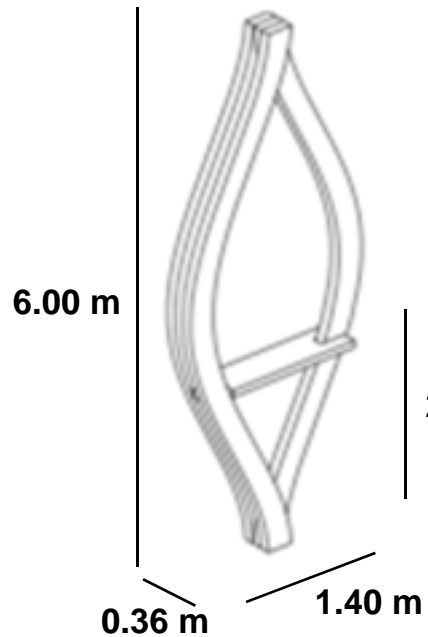


Position de la marche



variation du module

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 Student Steve Cherpillod

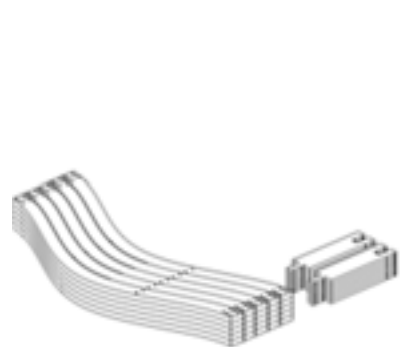


2.00 m

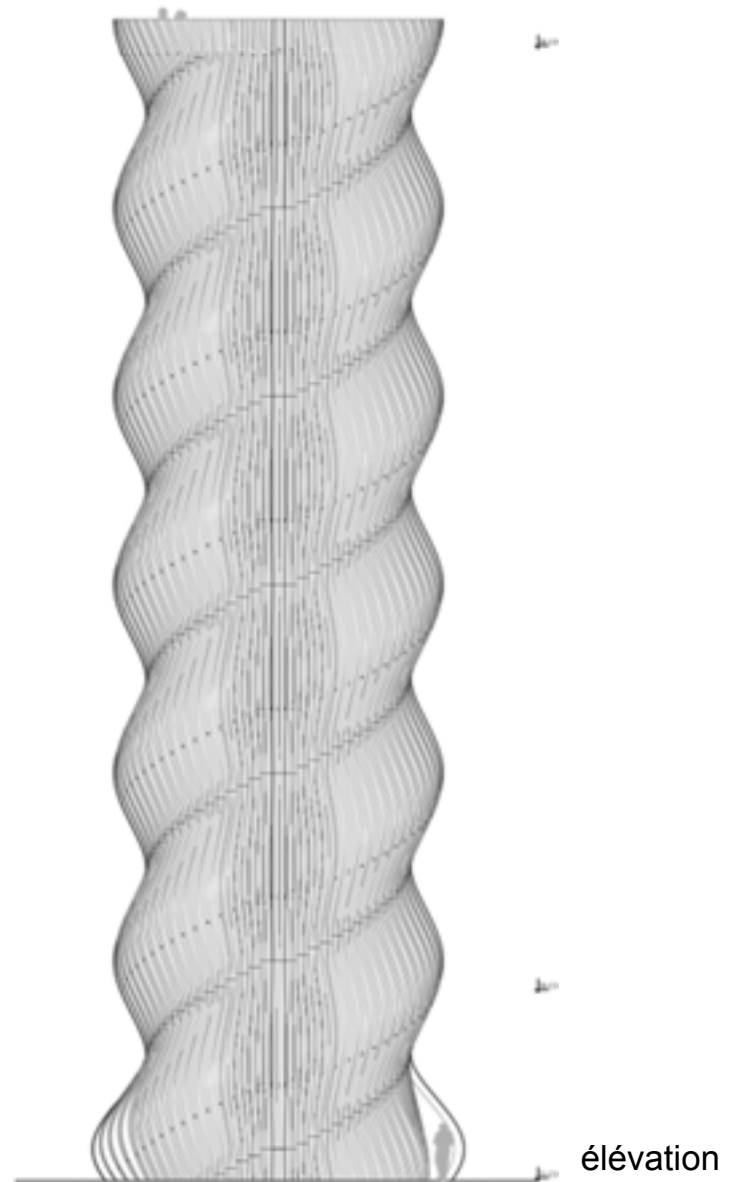
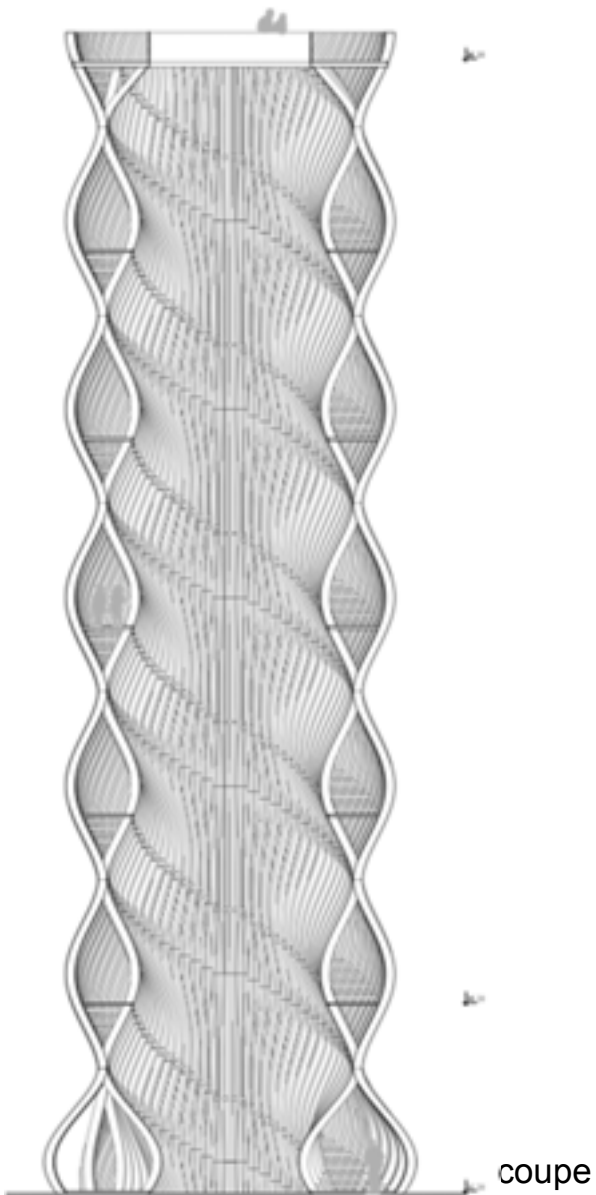
dimension du module



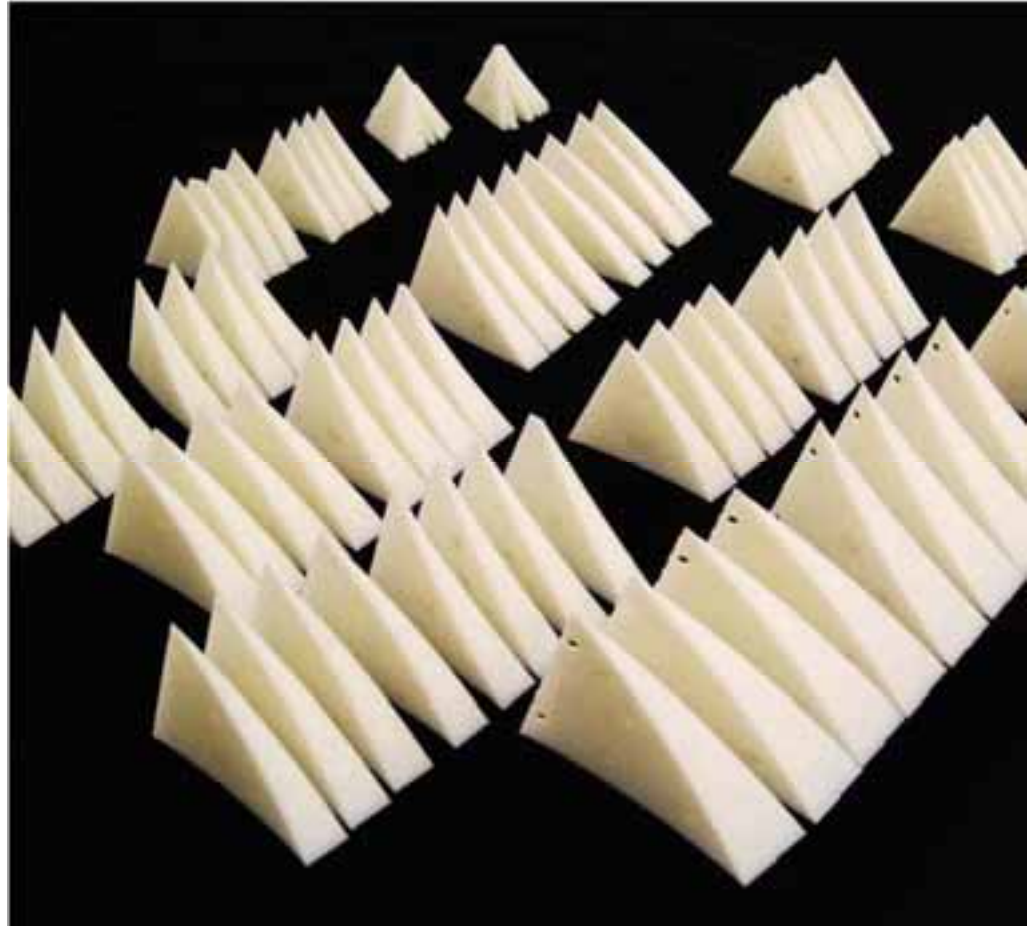
schéma assemblage



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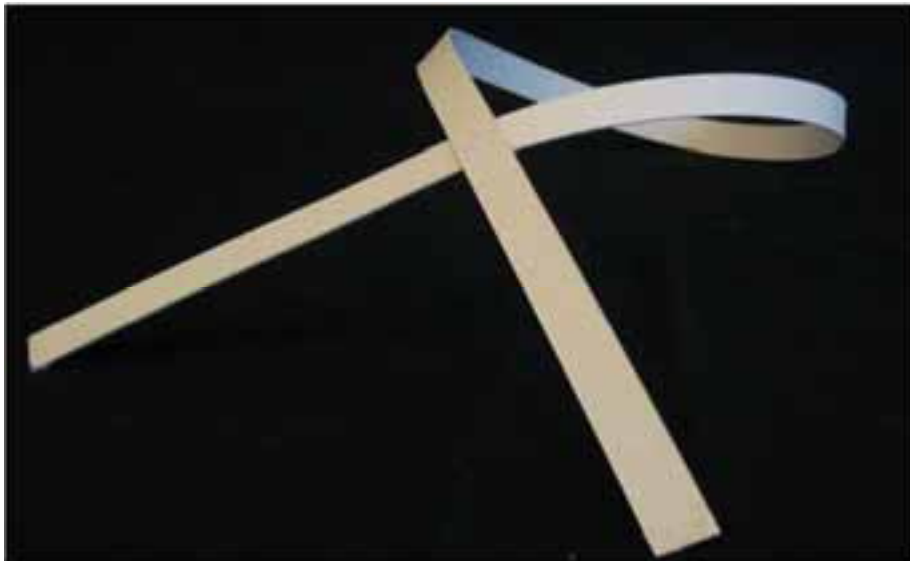
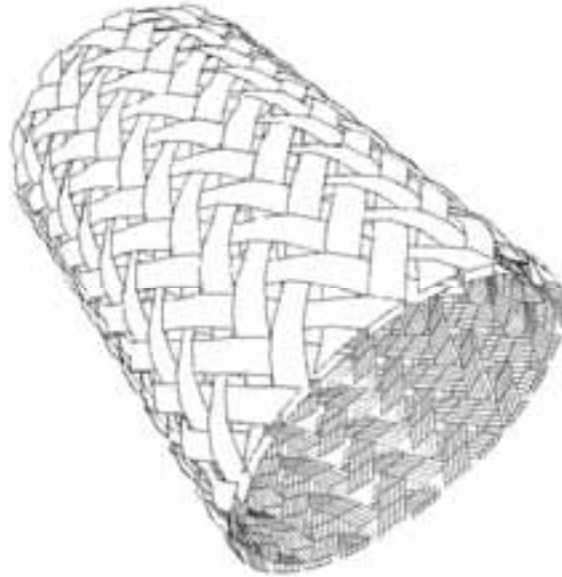


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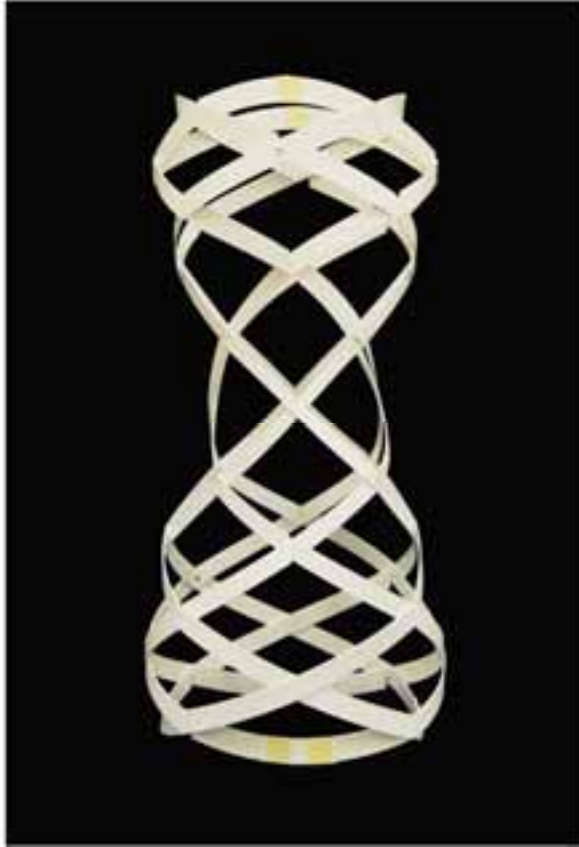


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Student Jonathan Hermann

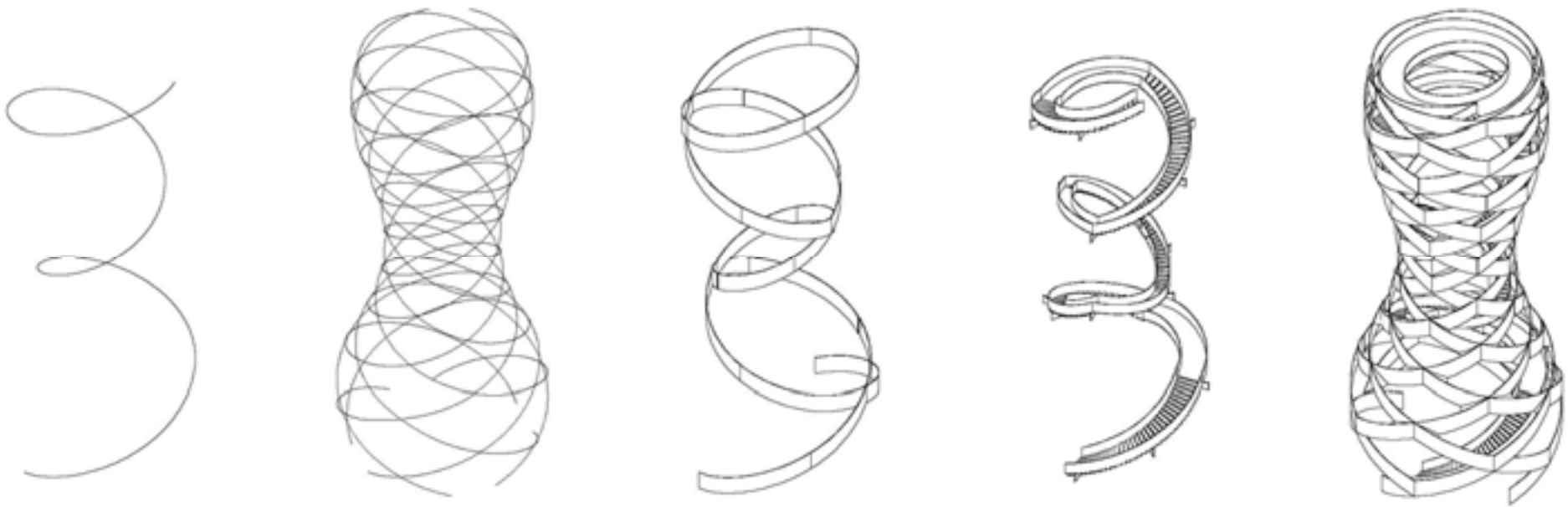
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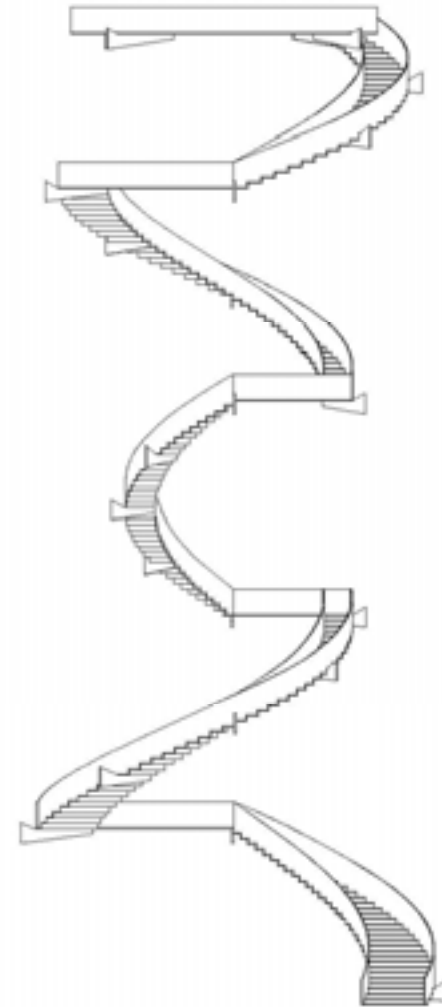
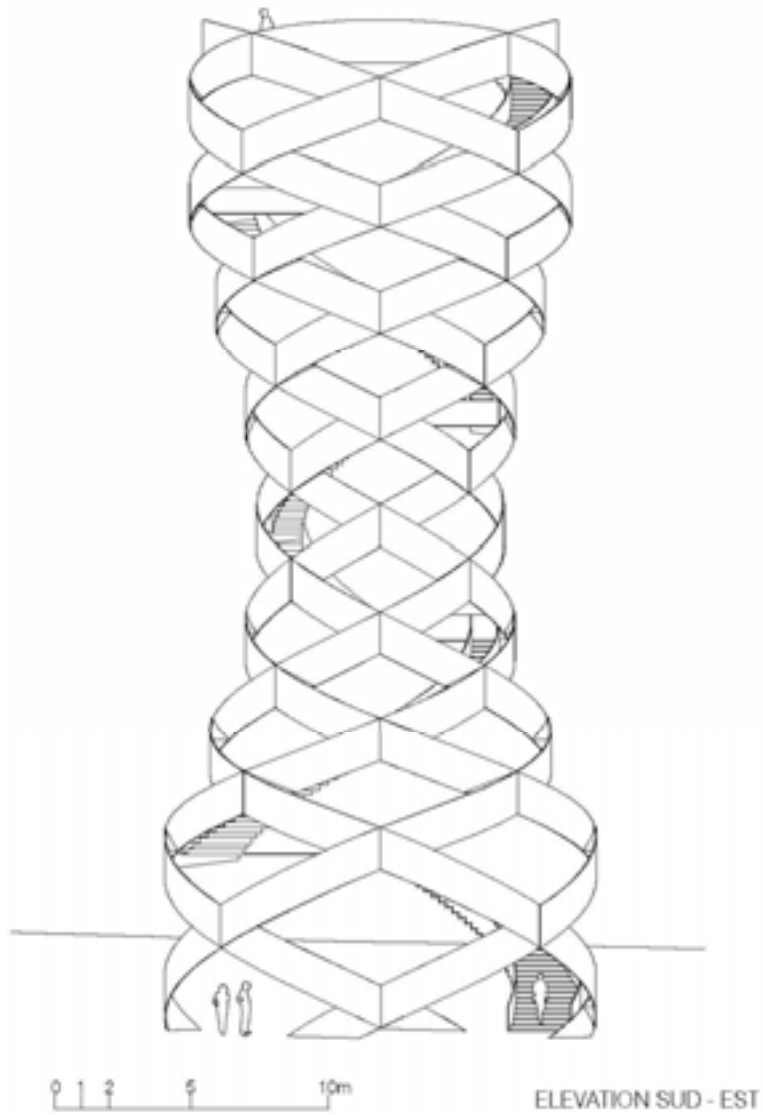
Atelier Weinand Autumn 09 Prof. Yves Weinand, Fred Hatt, Markus Hudert
Student Jonathan Hermann



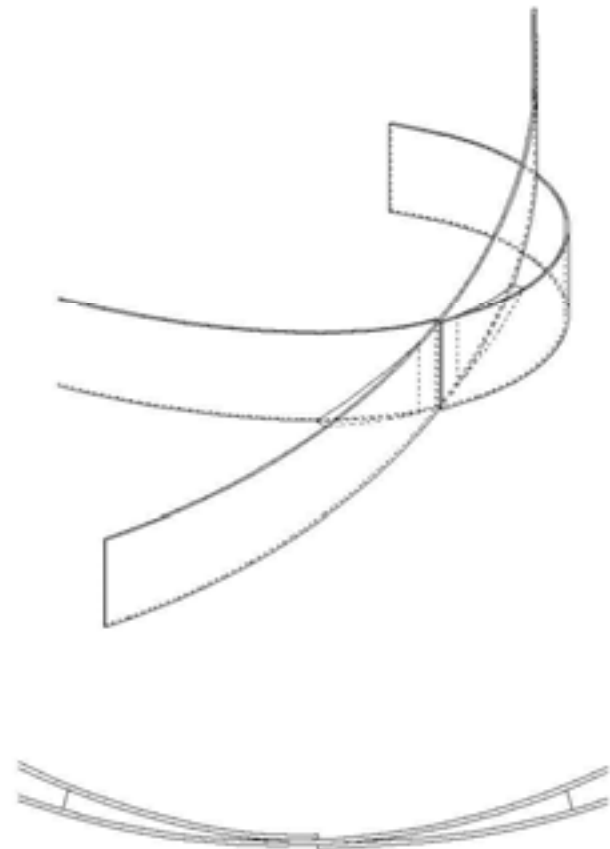
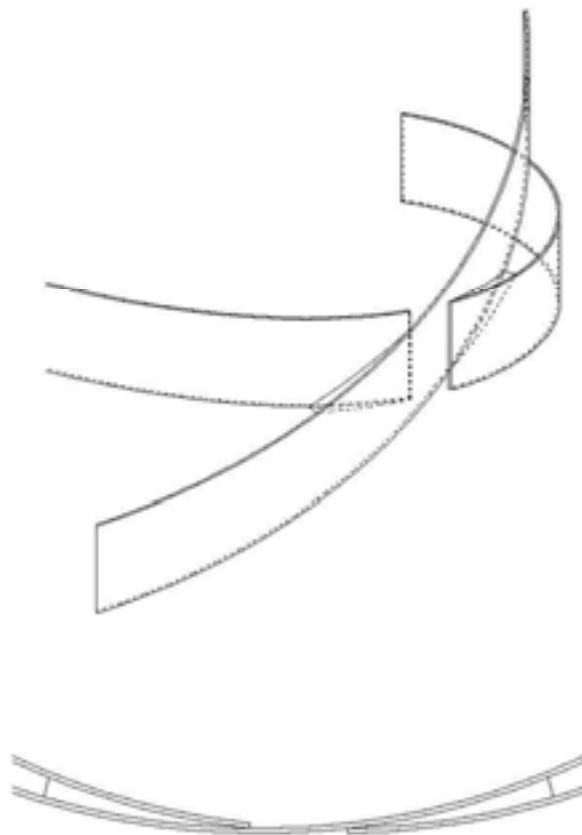
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Student Jonathan Hermann



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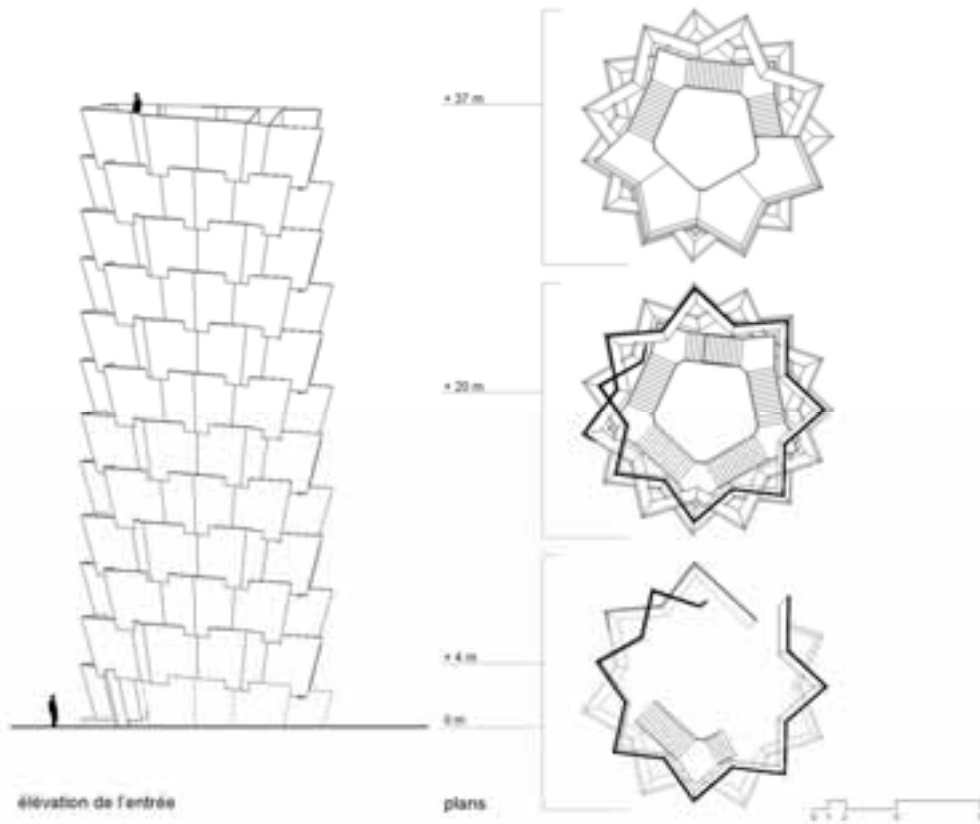
PRINCIPE D'ASSEMBLAGE

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 Yves Weinand

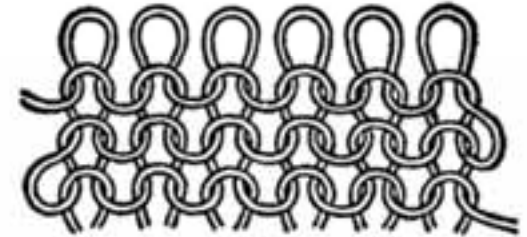
Répétition et intersection des éléments identiques



matière



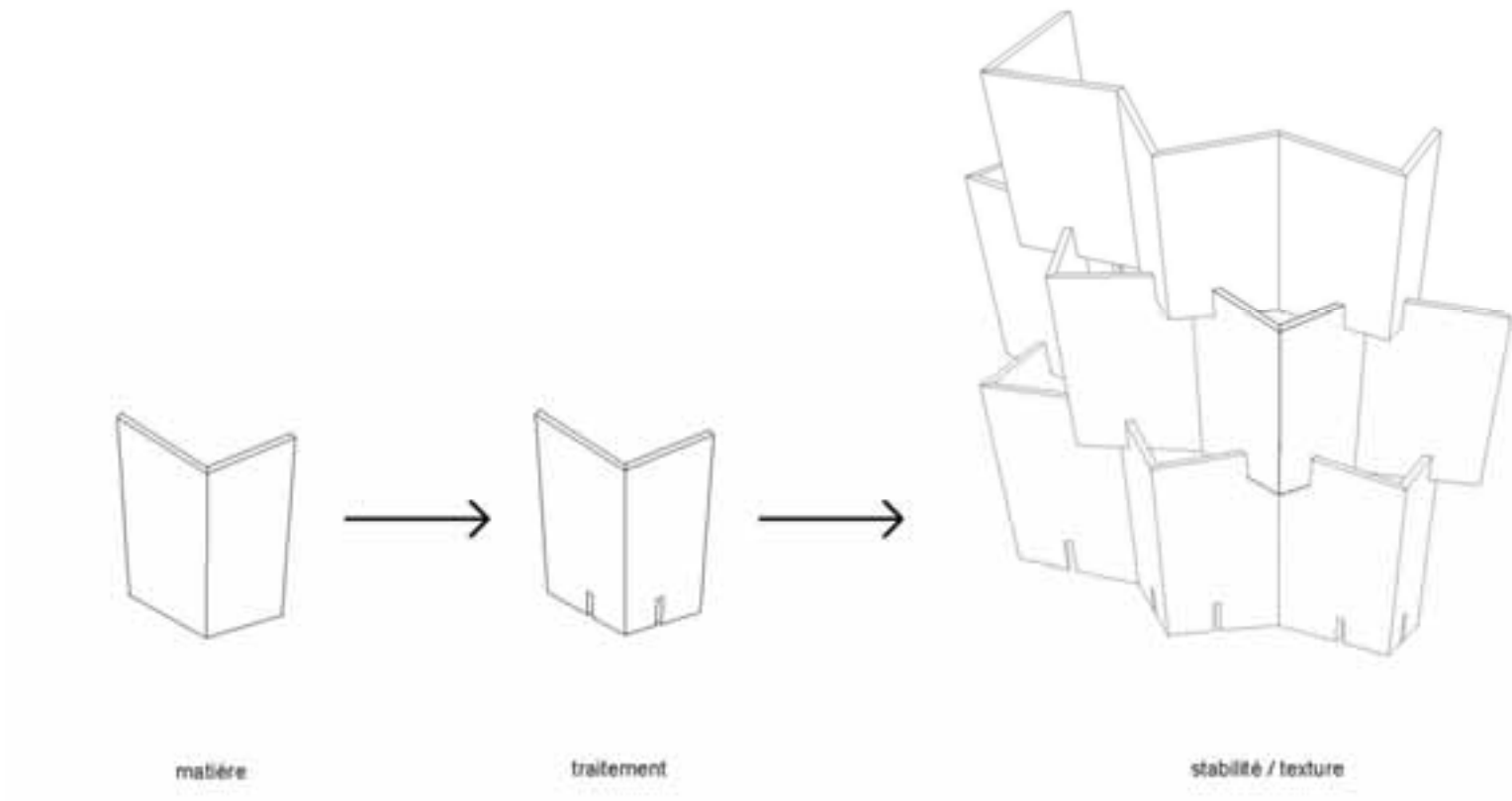
traitement



stabilité / texture

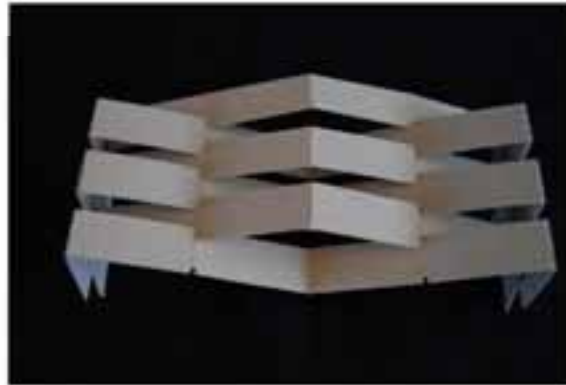
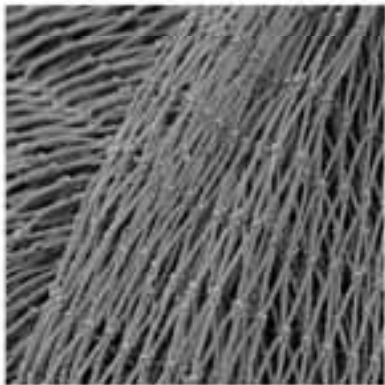
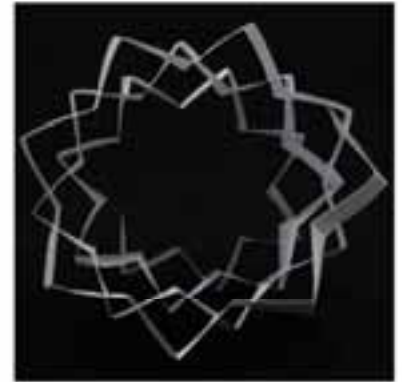
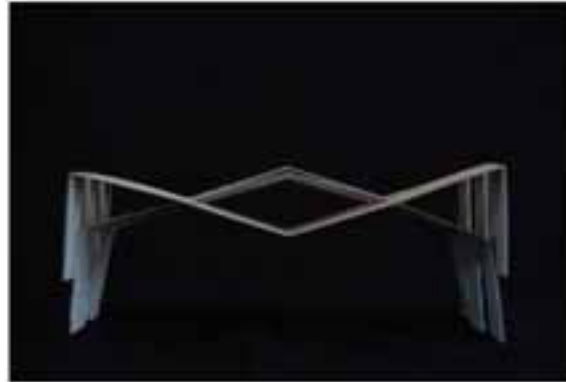
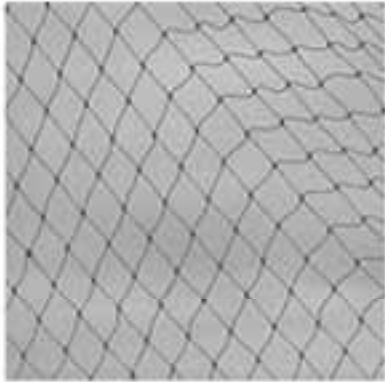
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Répétition et intersection des éléments identiques

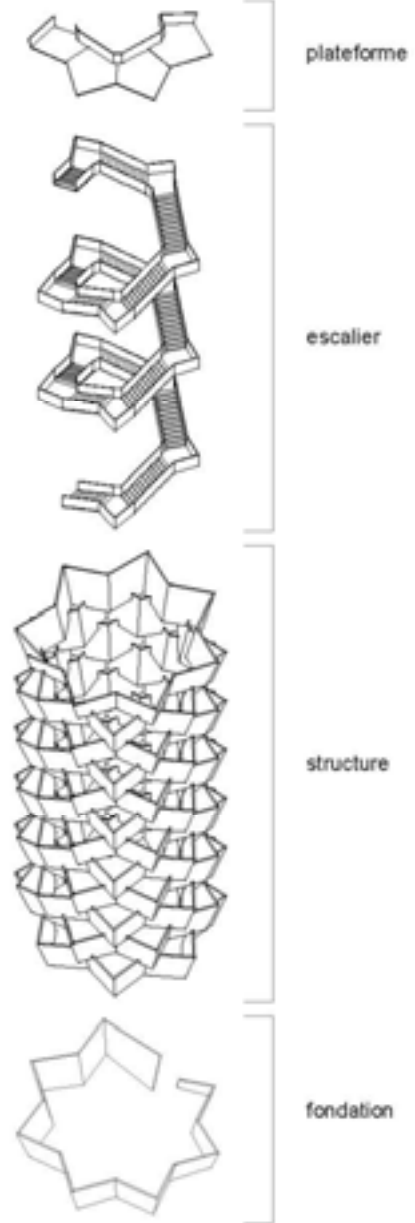
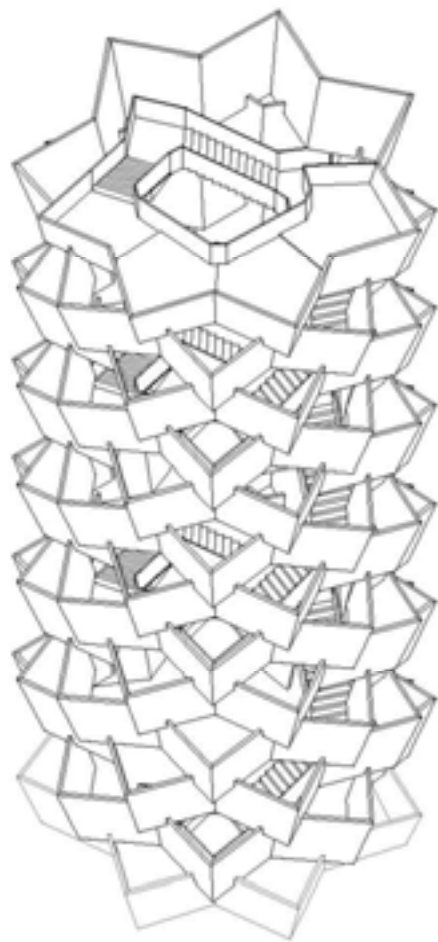


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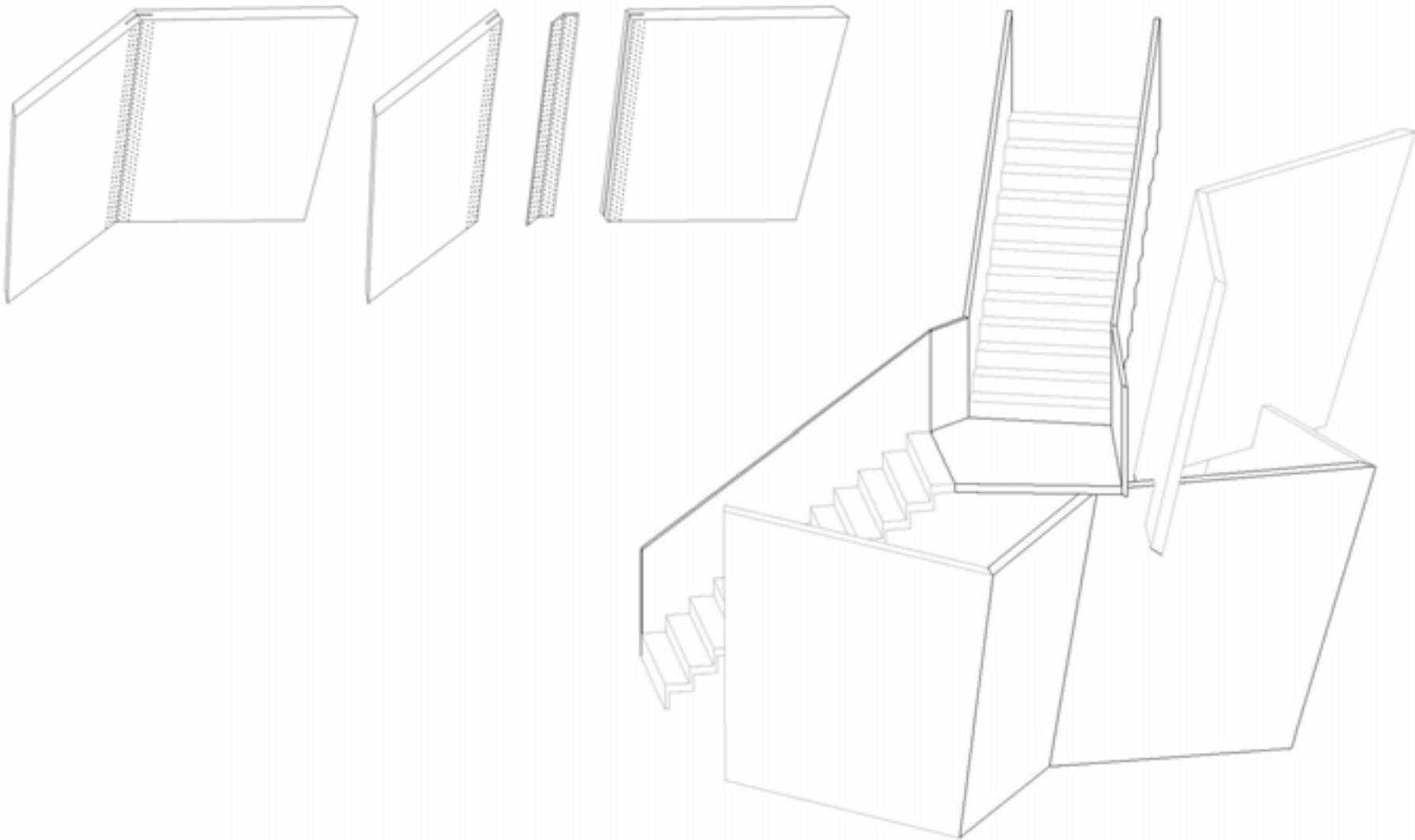
Perception du même objet



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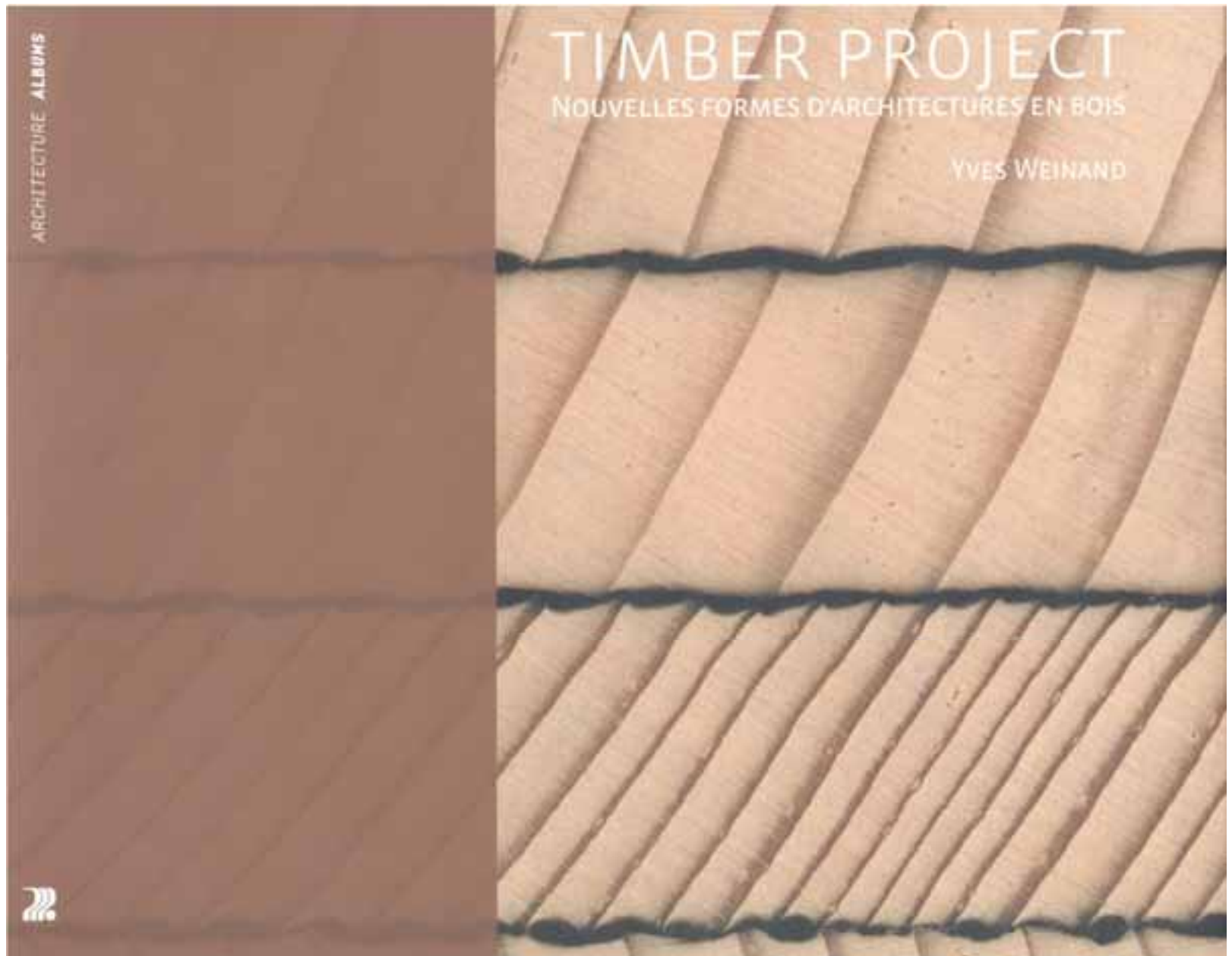
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Yves Weinand



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ARCHITECTURE ALBUMS

TIMBER PROJECT

NOUVELLES FORMES D'ARCHITECTURES EN BOIS

YVES WEINAND



Innovative Timber Constructions
Yves Weinand

Laboratory for timber constructions

Direction

Prof. Yves Weinand, ISA architect, EPFL civil engineer,

Associate Professor

Administration

Hildegard Bachmann, secretary

Staff

Ivo Stotz, EPFL architect, Dr.

Gilles Gouaty, DEA EDIIS Lyon (F) computer scientist, Dr.

Hani Buri, EPFL architect, scientific collaborator

François Demoures, EPFL mathematician, PhD assistant

Markus Hudert, Städelschule Frankfurt (D) architect, PhD
assistant

Johannes Natterer, EPFL SIA civil engineer, Dr., scientific
collaborator

Masoud Sistaninia, Iran University of Science and Technology,
Teheran,

mechanical engineer, PHD assistant





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