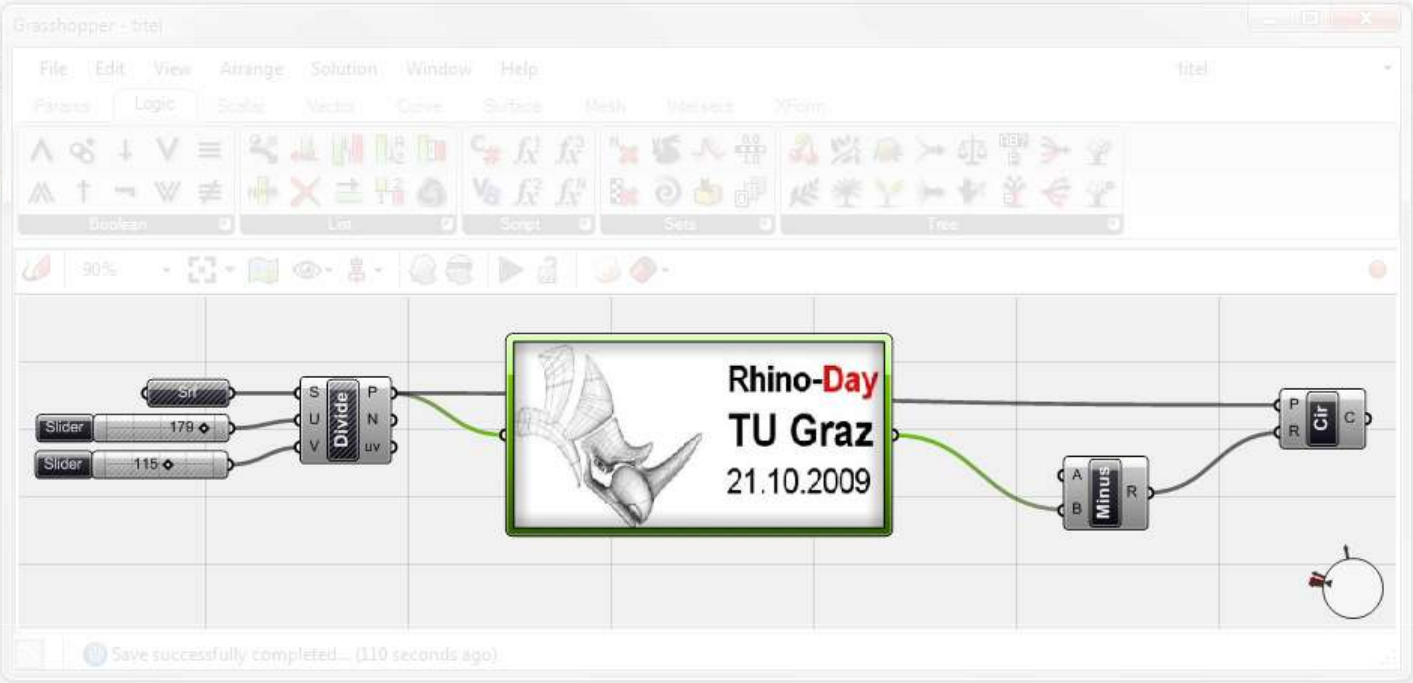
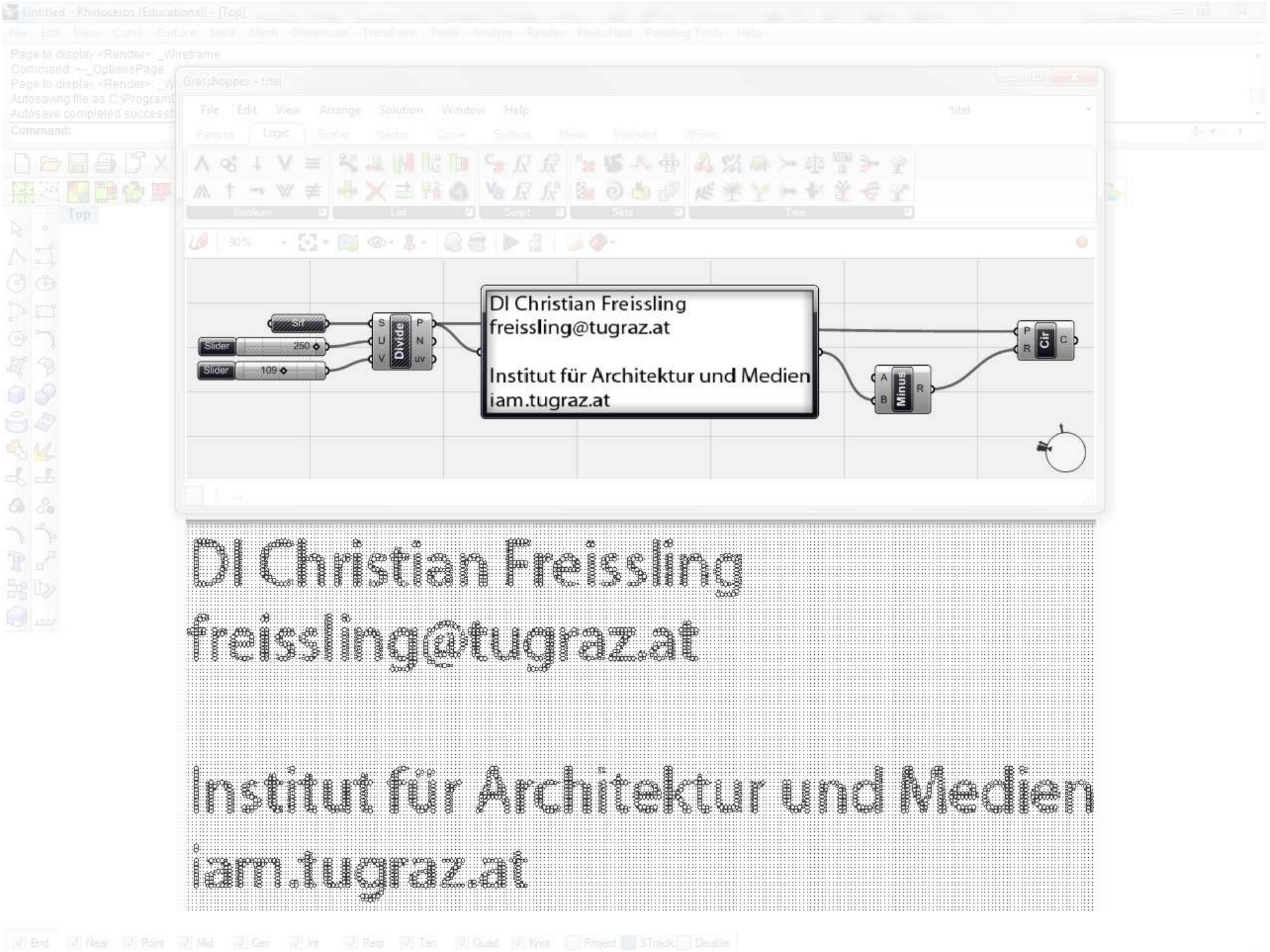
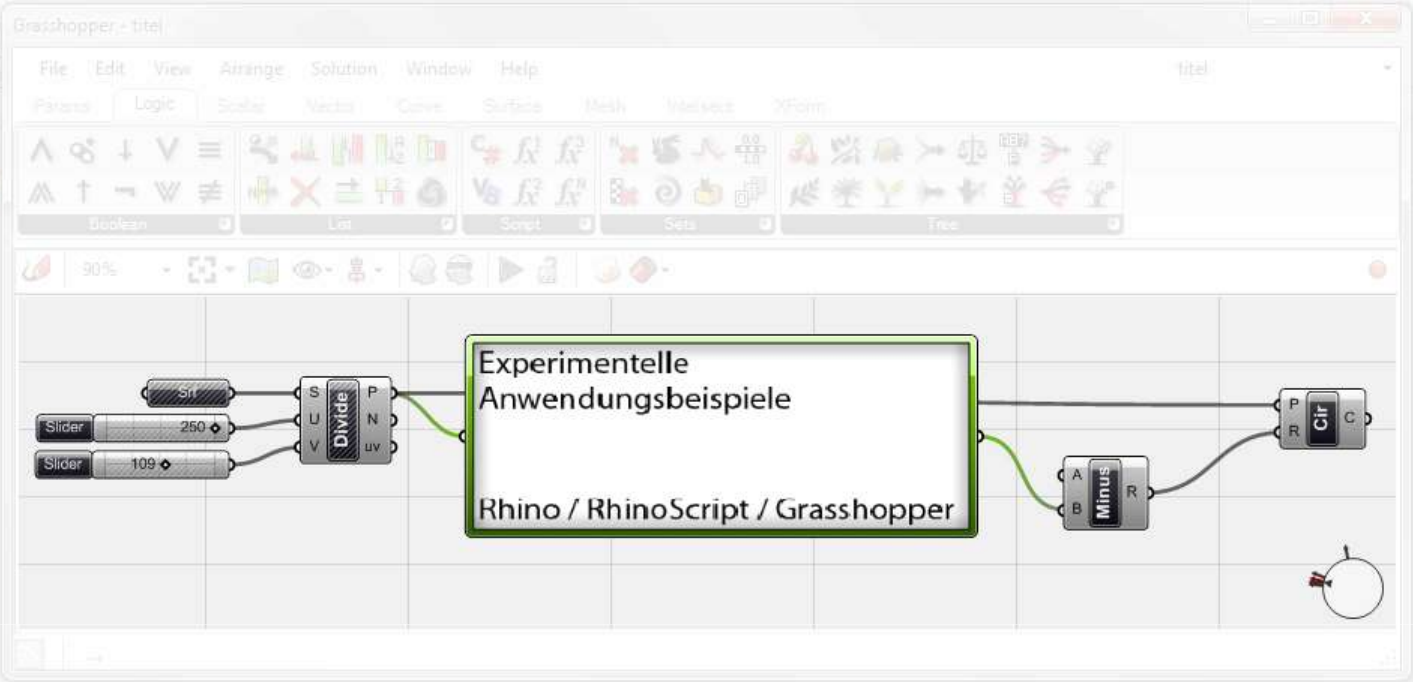

Grasshopper - titel
File Edit View Arrange Solution Window Help
Boolean
List
Script
Sets
Tree
Srf
Slider 179
Slider 115
Divide
Rhino-Day
TU Graz
21.10.2009
Minus
Cir
Save successfully completed... (110 seconds ago)

Rhino-Day
TU Graz
21.10.2009


Grasshopper - titel
File Edit View Arrange Solution Window Help
titel
Boolean
List
Script
Sets
Tree
Srf
Slider 250
Slider 109
Divide
S U V
P N uv
DI Christian Freissling
freissling@tugraz.at
Institut für Architektur und Medien
iam.tugraz.at
Minus
A B R
Cir
P R C
DI Christian Freissling
freissling@tugraz.at
Institut für Architektur und Medien
iam.tugraz.at



Experimentelle Anwendungsbeispiele

Rhino / RhinoScript / Grasshopper

Projektübersicht

- Nationalmuseum | Wettbewerb Oslo
- John Paul II Center | Wettbewerb Krakau
- Kolumbarium | Zentralfriedhof Graz
- CNC Curve Pattern
- Thalia Neu | Wettbewerb Graz
- Digitale Fabrikation | LV WS09
- Mehrzeller | Diplomarbeit

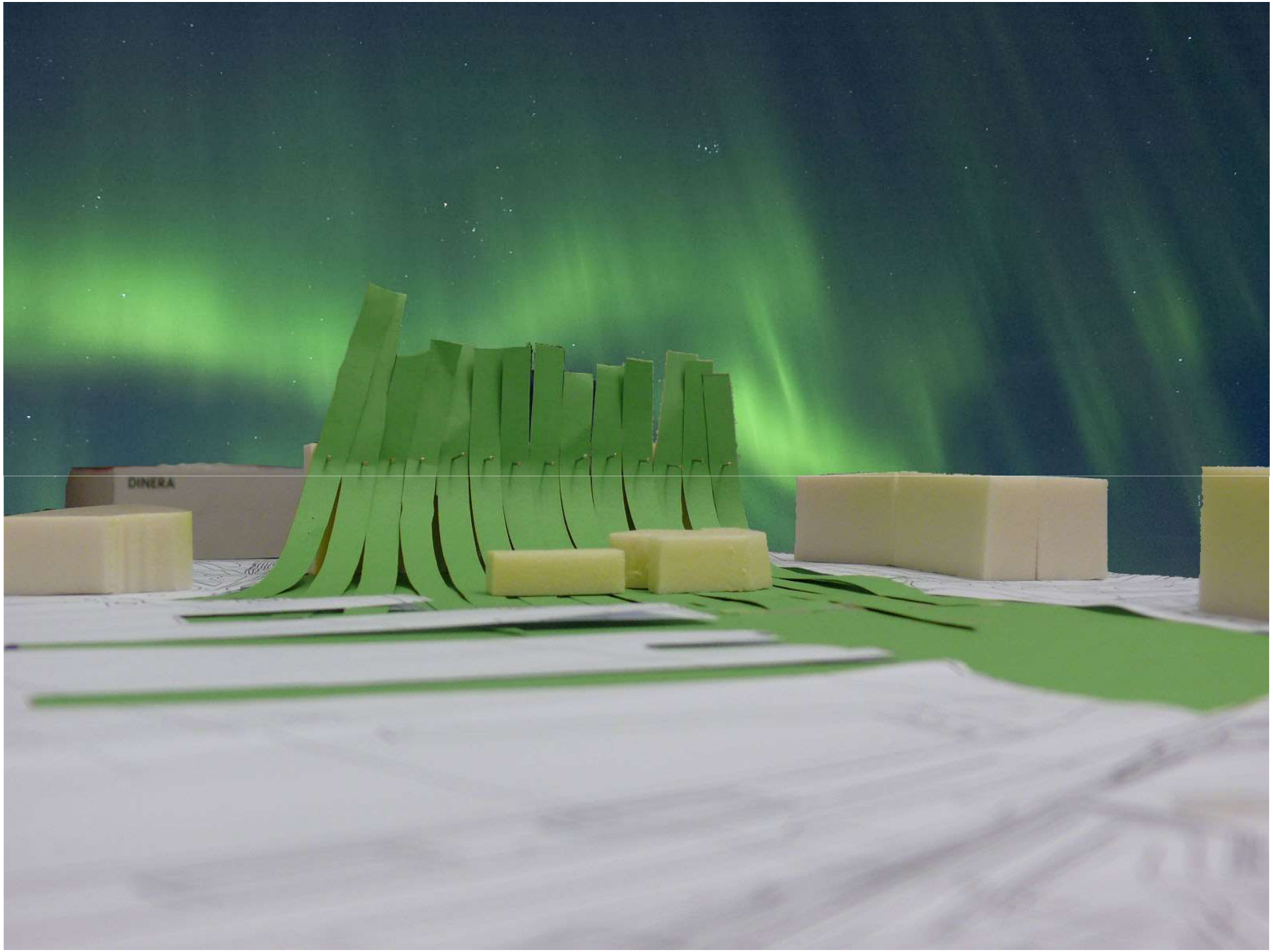
Nationalmuseum - Oslo

Wettbewerb 2009

Zusammenarbeit mit:

HOFRICHTER-RITTER Architekten ZT GmbH

3d Modell | Parametrisches Modell (Grasshopper)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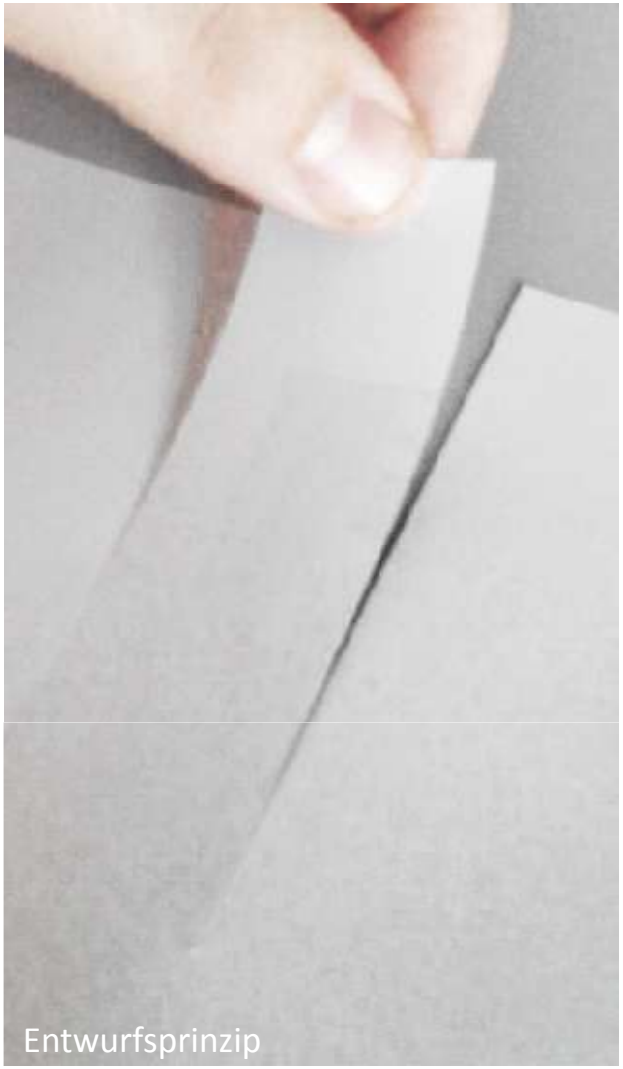
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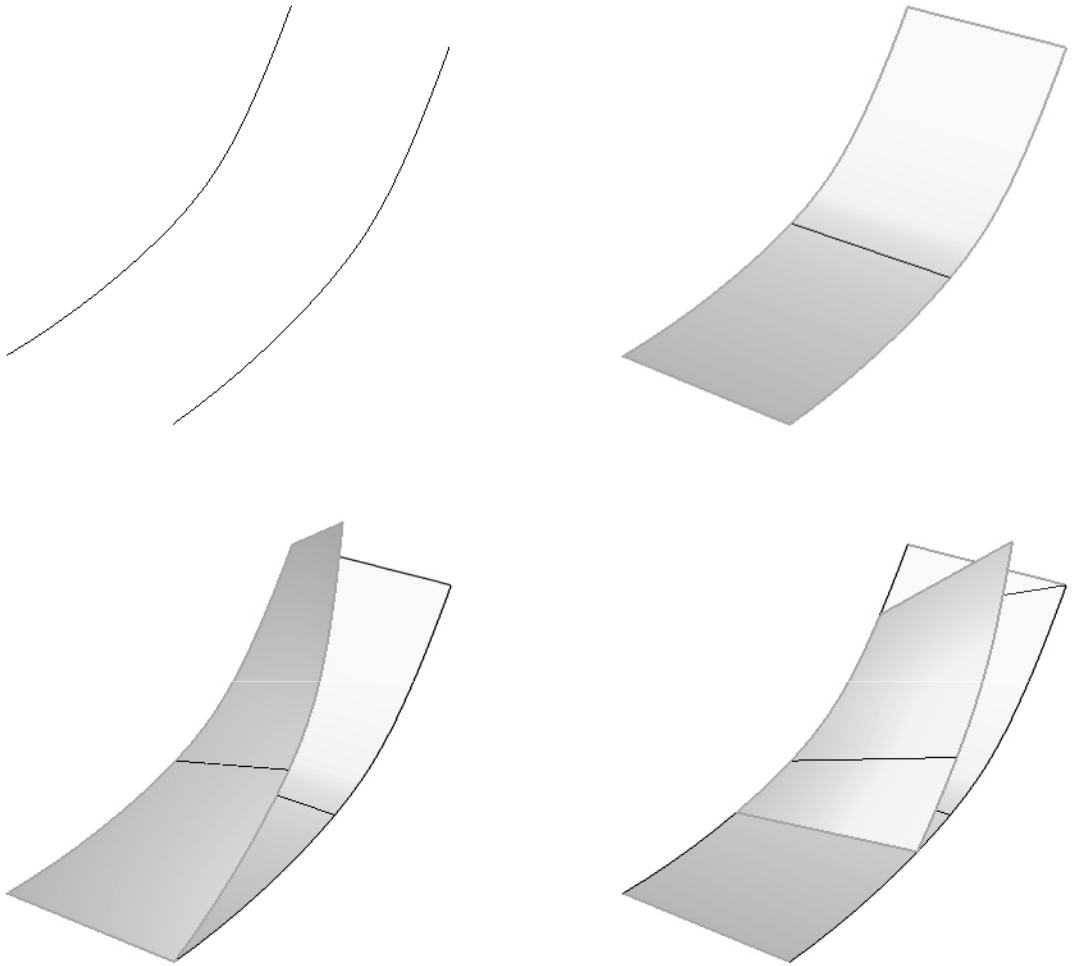

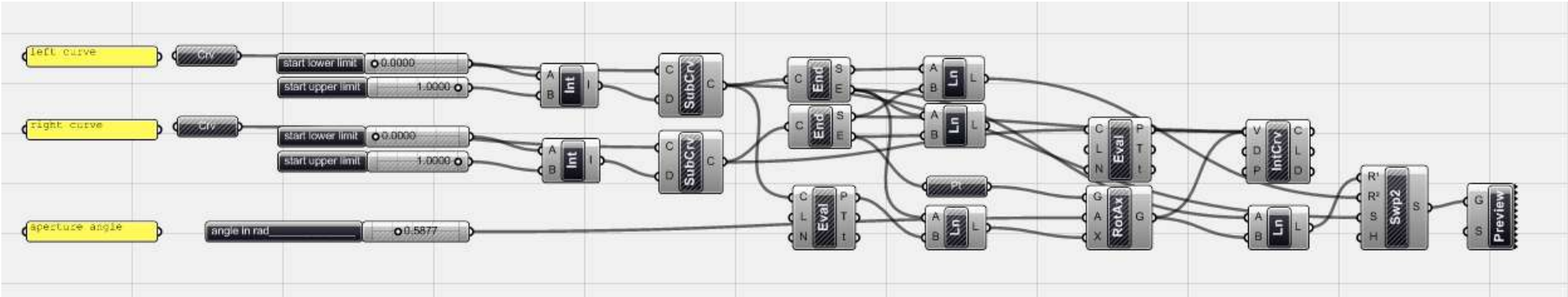
left curve
Crv
start lower limit
0.0000
start upper limit
1.0000
Int
SubCrv
right curve
Crv
start lower limit
0.0000
start upper limit
1.0000
Int
SubCrv
aperture angle
angle in rad
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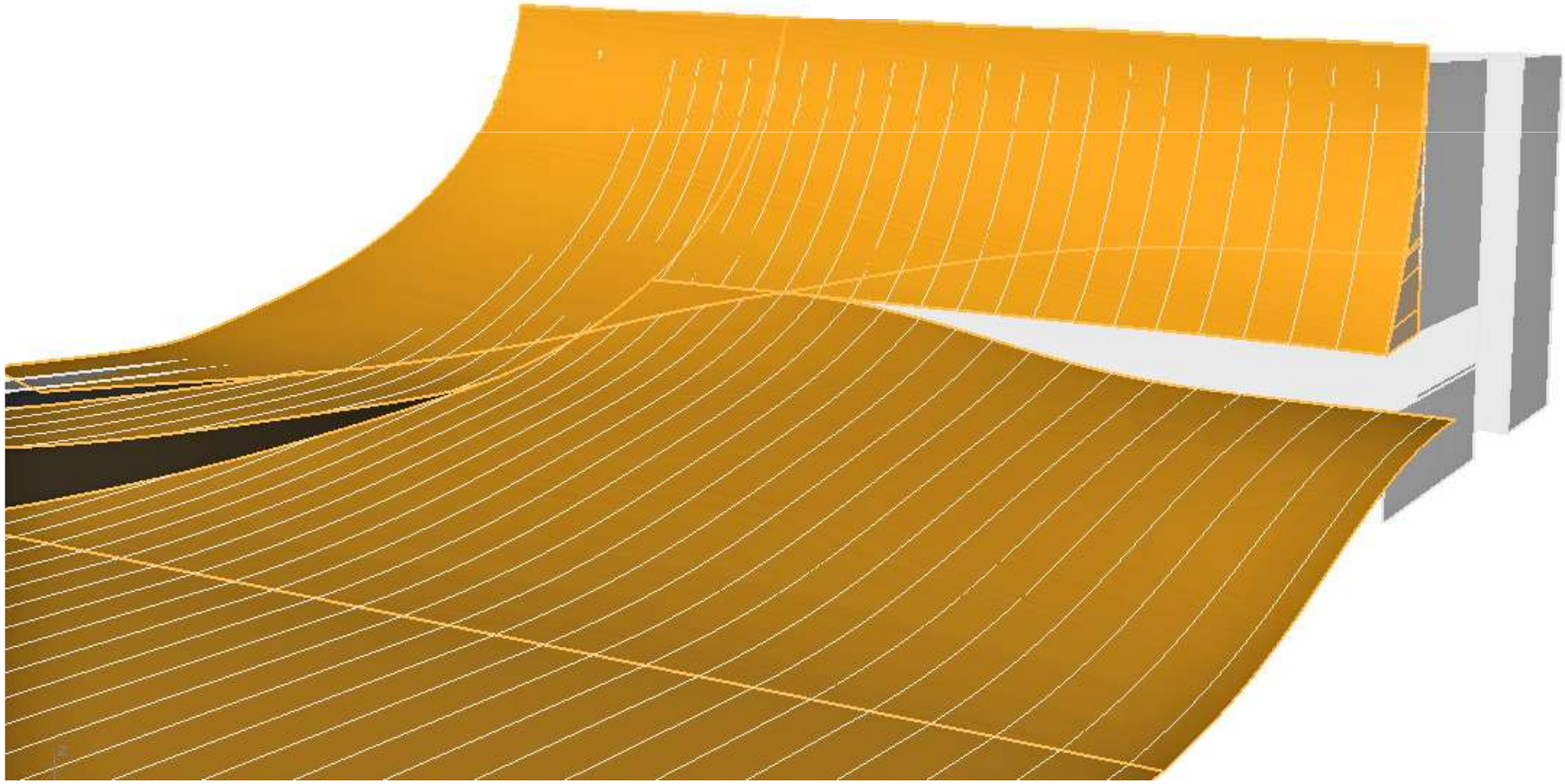
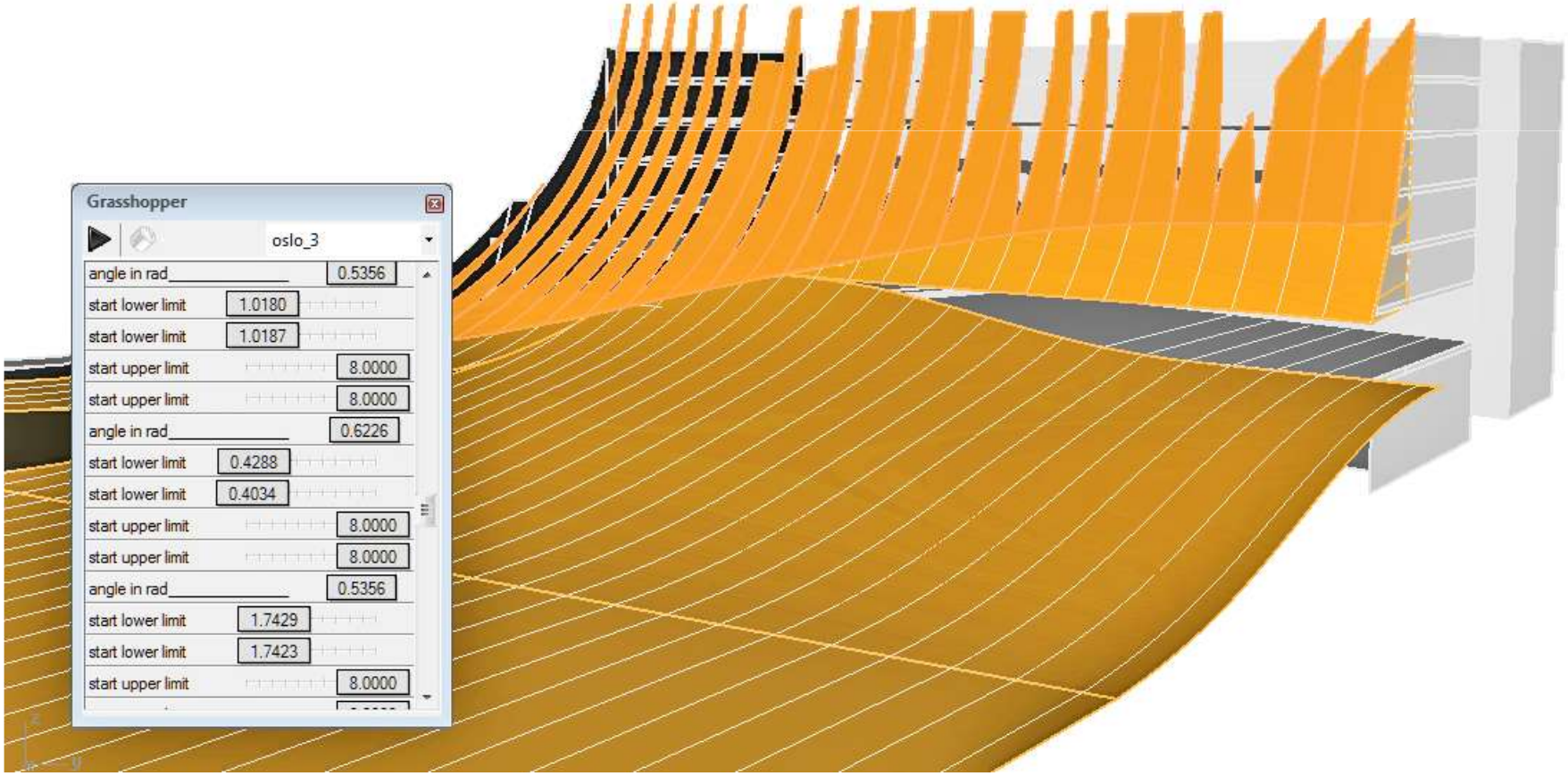
End
End
Eval
Ln
Ln
Ln
Eval
RotAx
IntCrv
Ln
Swp2
Preview




Grasshopper
oslo_3
angle in rad 0.5356
start lower limit 1.0180
start lower limit 1.0187
start upper limit 8.0000
start upper limit 8.0000
angle in rad 0.6226
start lower limit 0.4288
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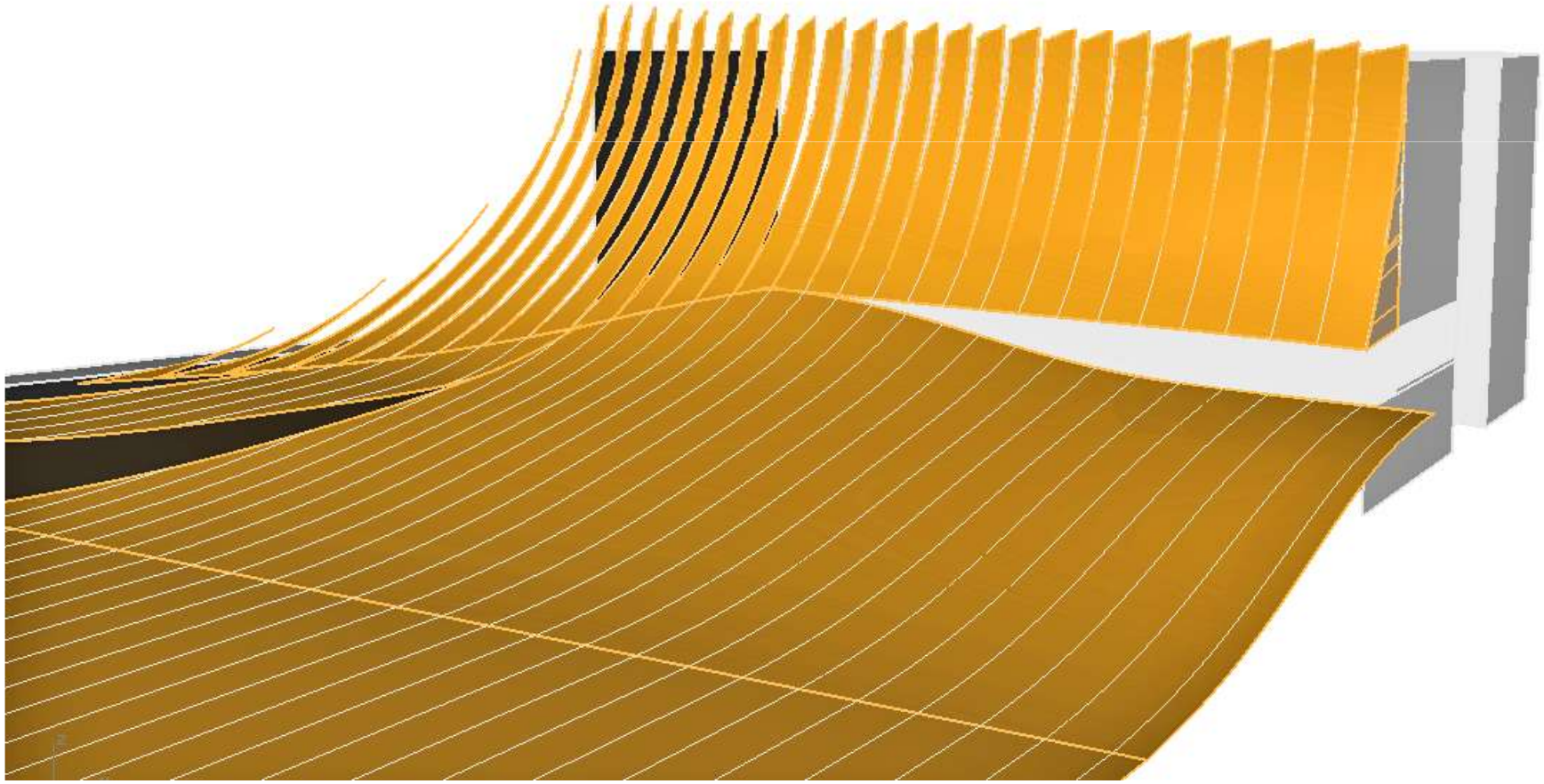
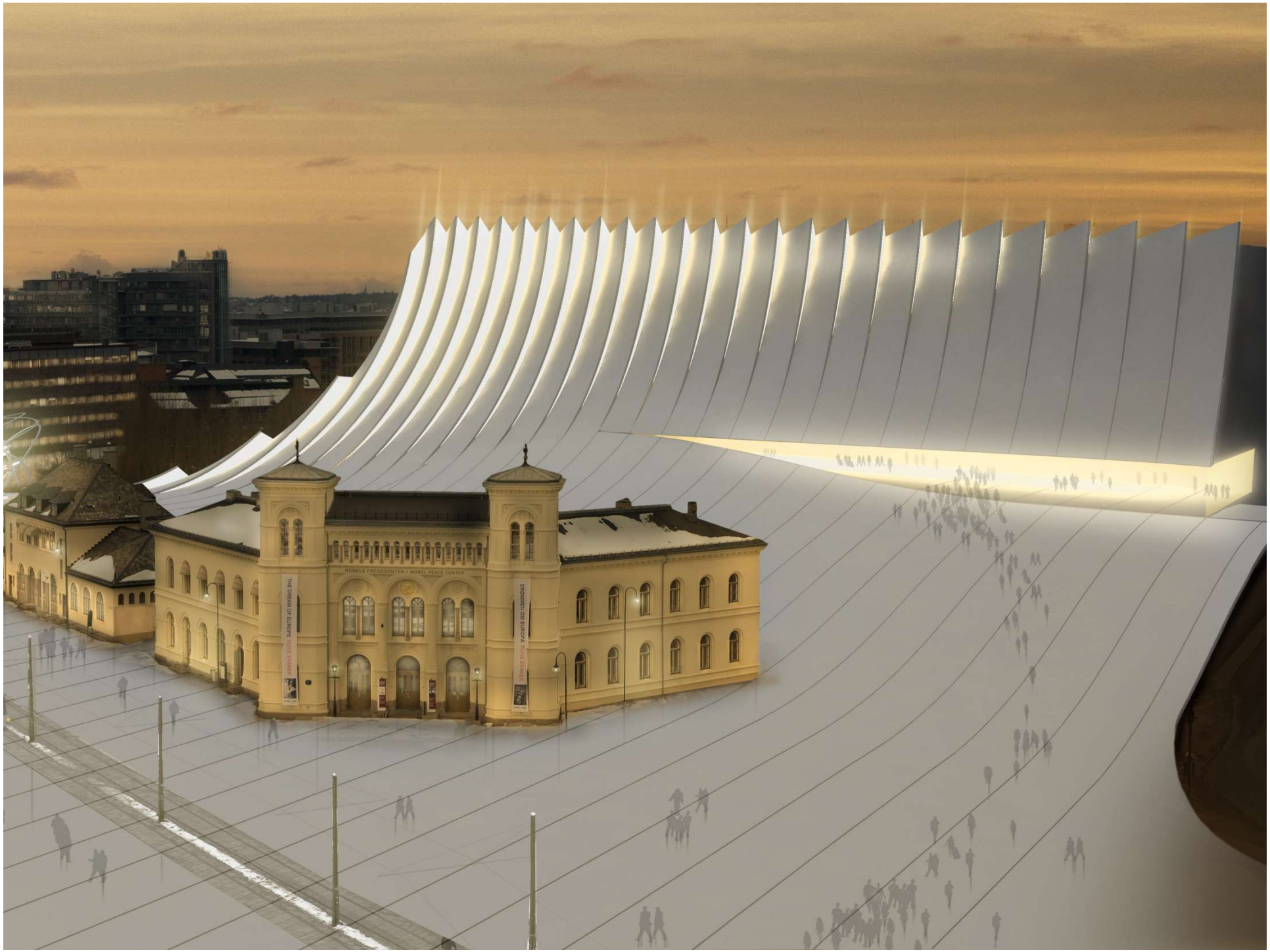



NOBELS FREDSSENTER • NOBEL PEACE CENTER
THE DREAM OF EUROPE
DRØMMEN OM EUROPA

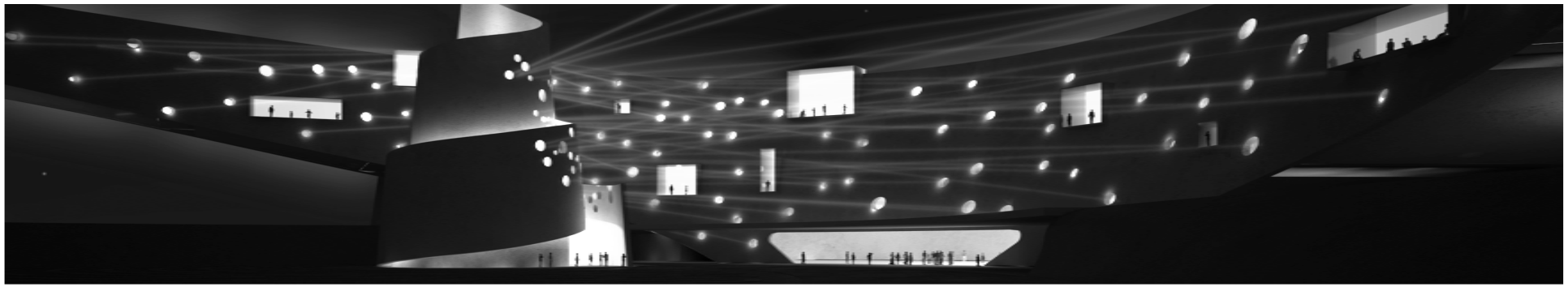
John Paul II Center

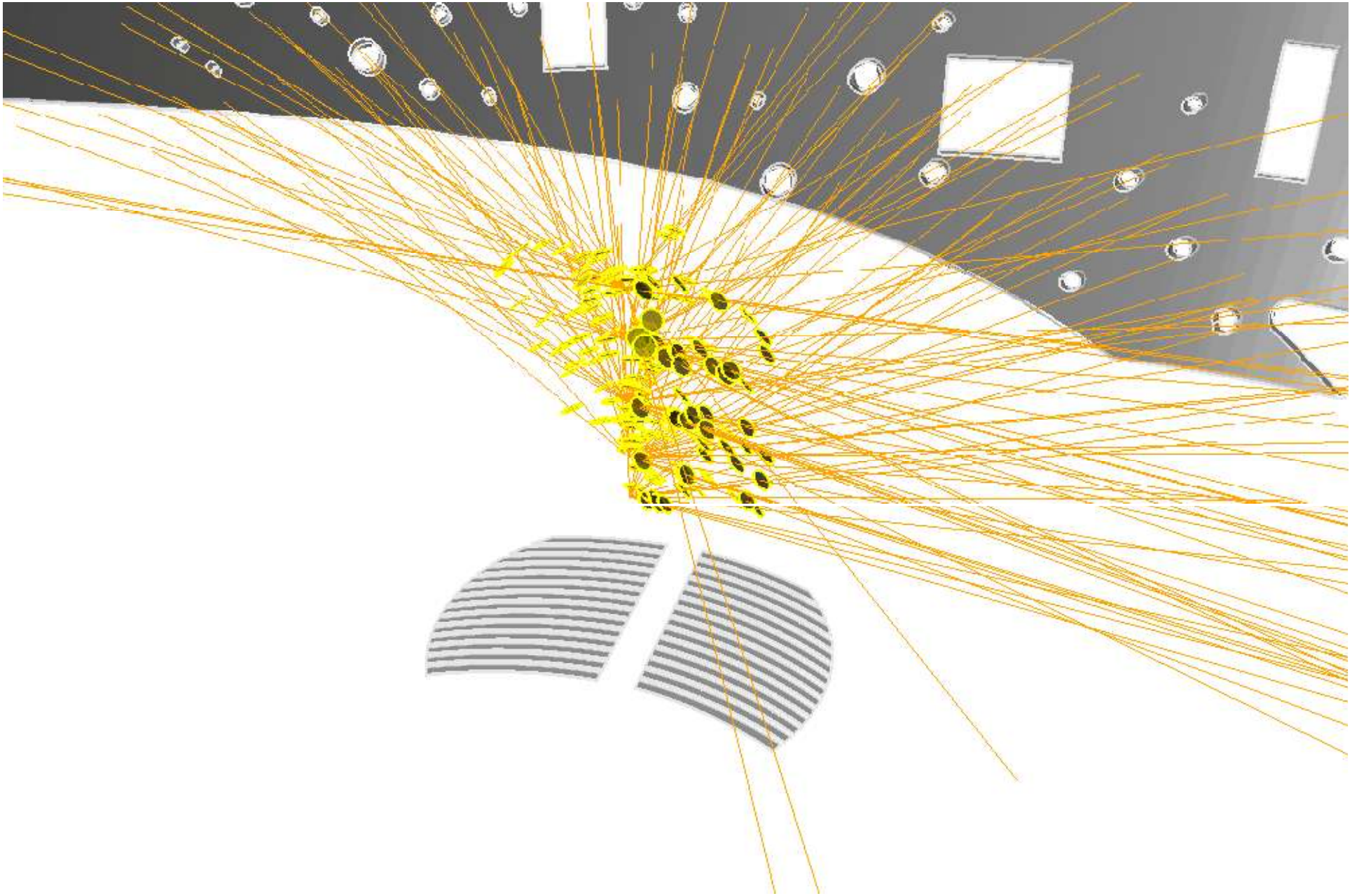
Wettbewerb 2007

Zusammenarbeit mit:

HOFRICHTER-RITTER Architekten ZT GmbH

3d Modell | RhinoScript-Lichtskulptur





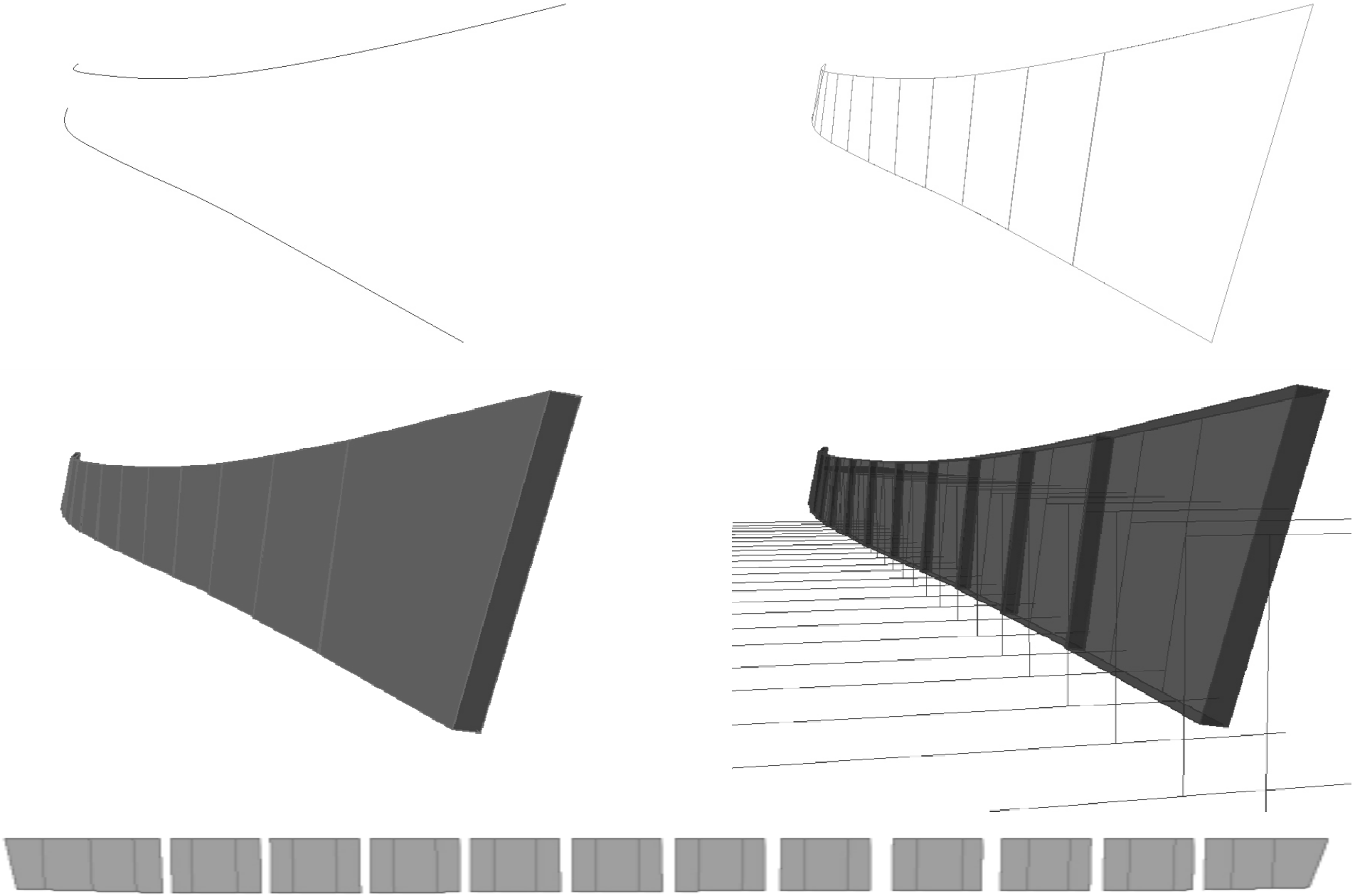
Kolumbarium – Zentralfriedhof Graz

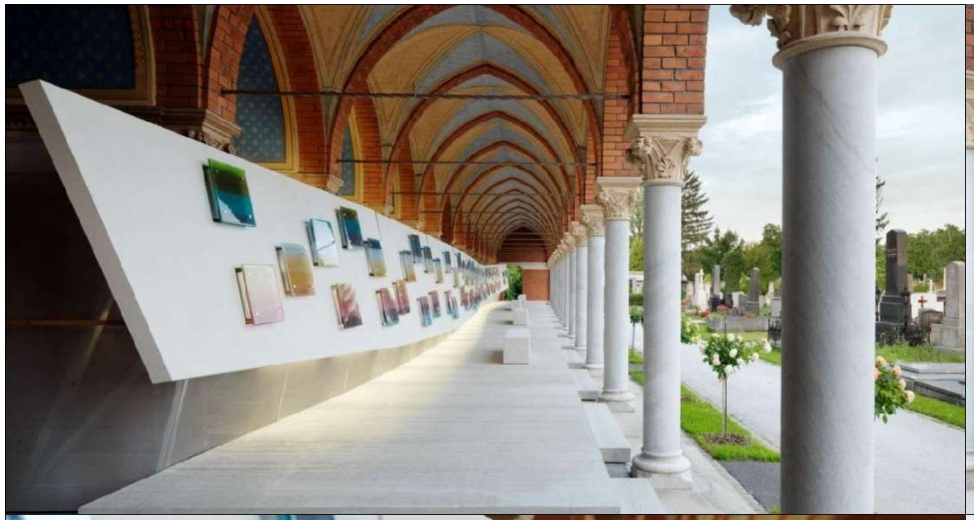
Projekt 2008

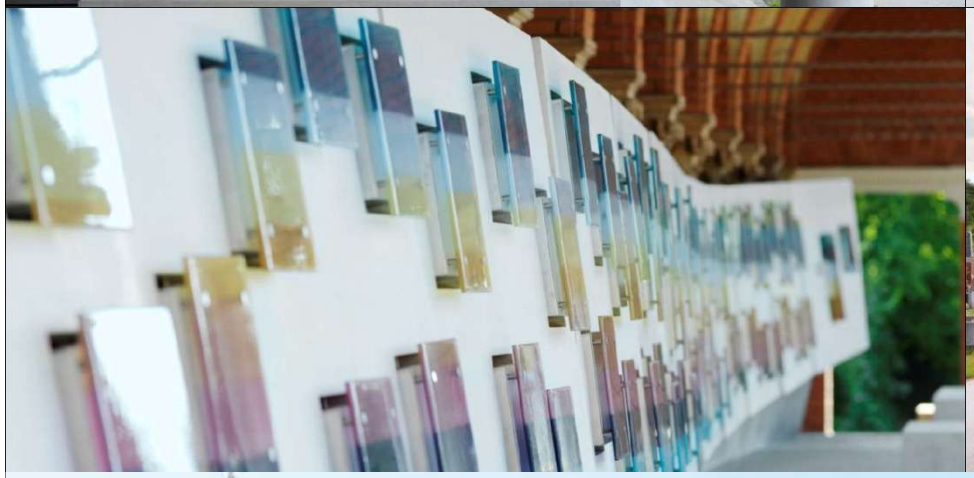
Zusammenarbeit mit:

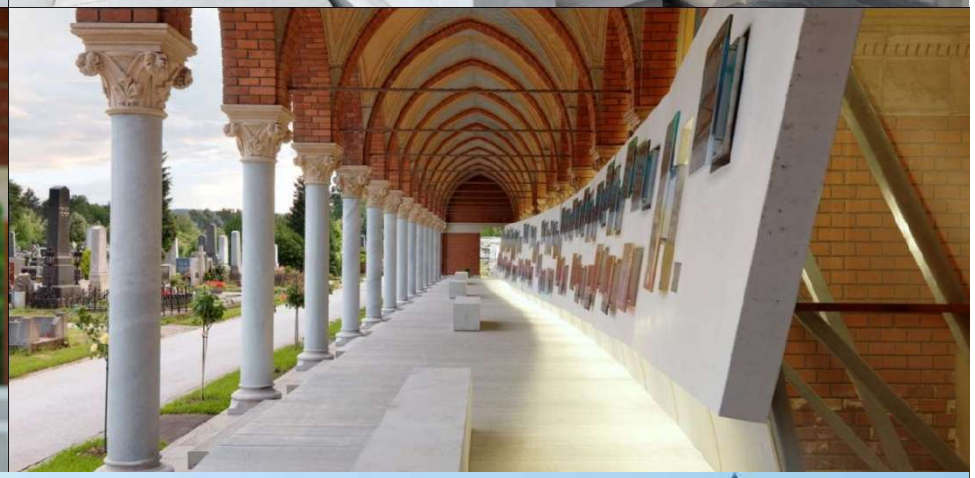
HOFRICHTER-RITTER Architekten ZT GmbH

3d Modell | Parametrisches Modell (Grasshopper)





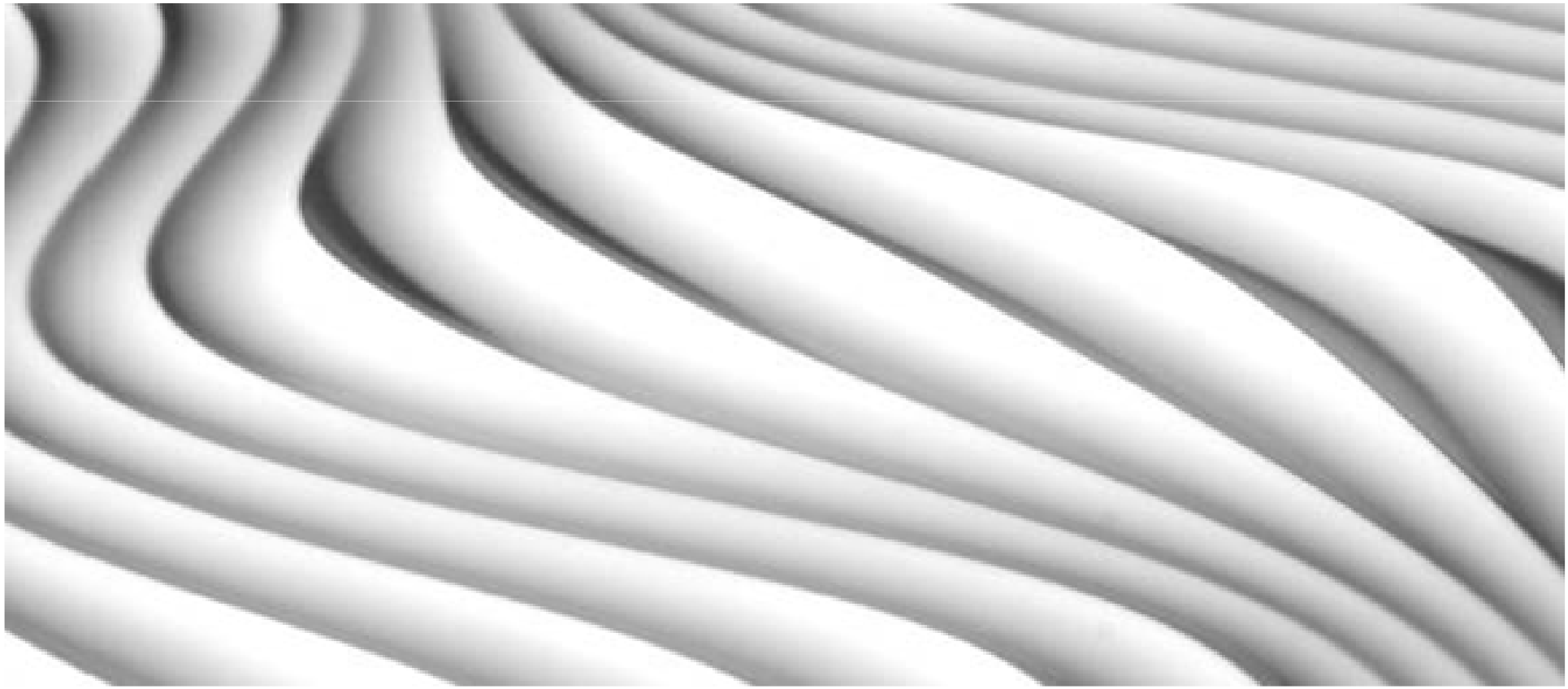


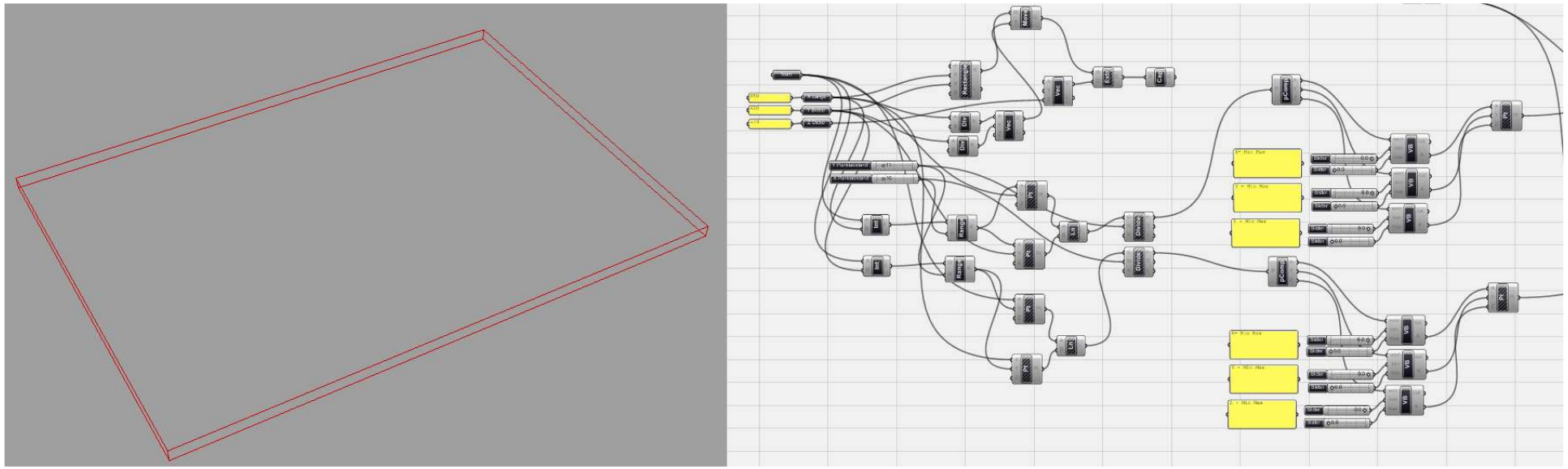


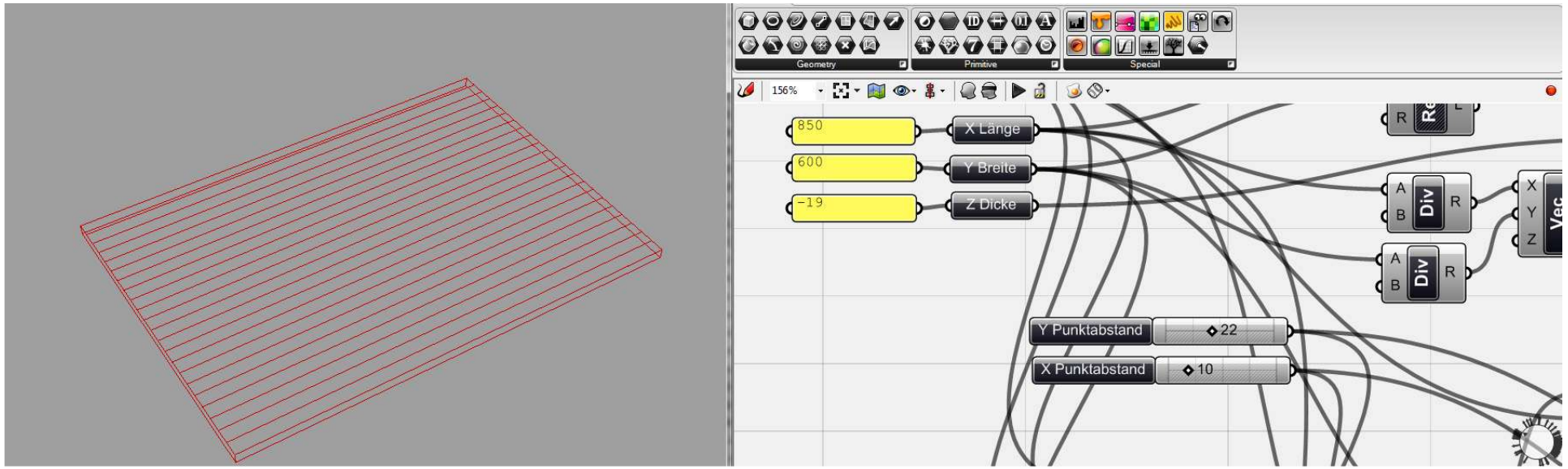
CNC Curve Patterns I

Experiment 2009

Parametrische Modelle (Grasshopper)



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Primitive
Special
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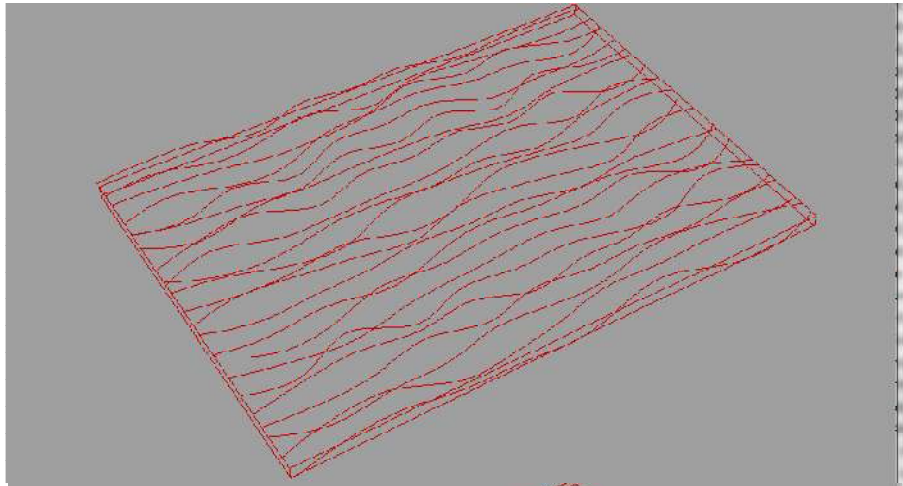
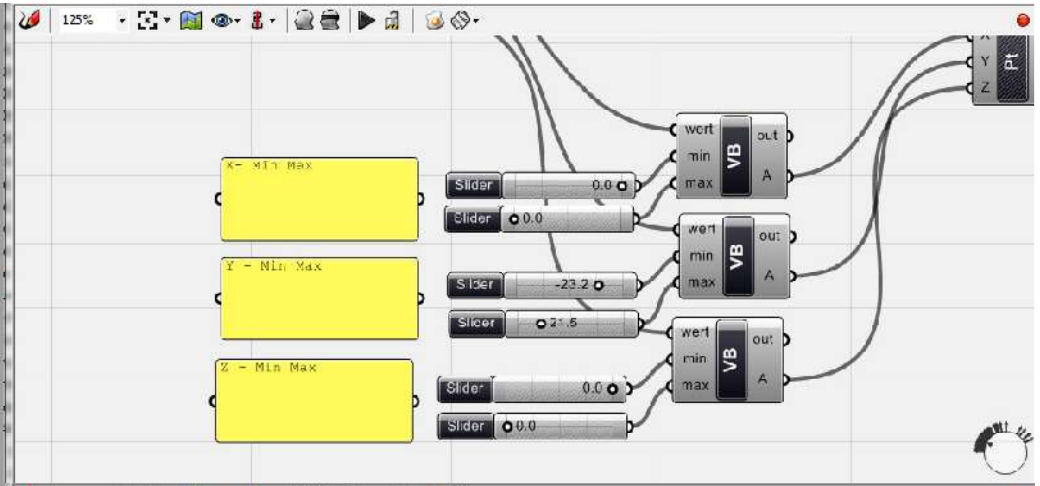
X Länge
600
Y Breite
-19
Z Dicke
Div
Div
Y Punktabstand
22
X Punktabstand
10




125%
X- Min Max
Y - Min Max
Z - Min Max
Slider
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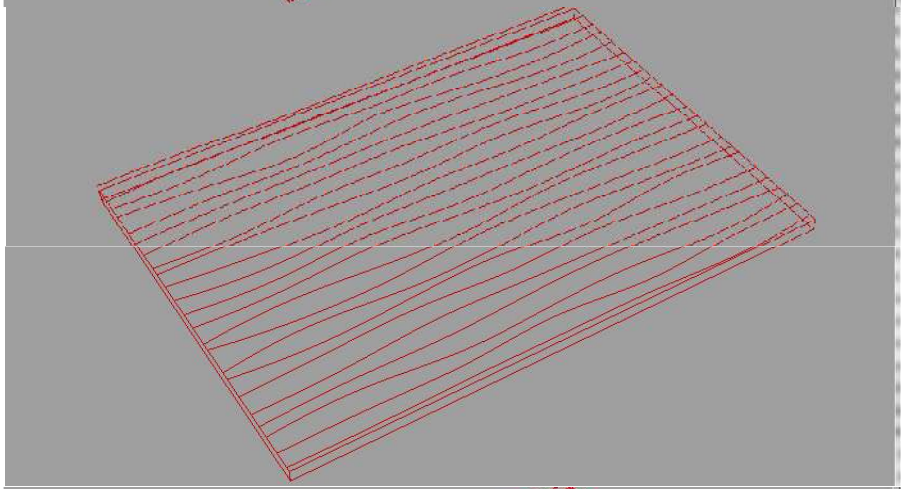
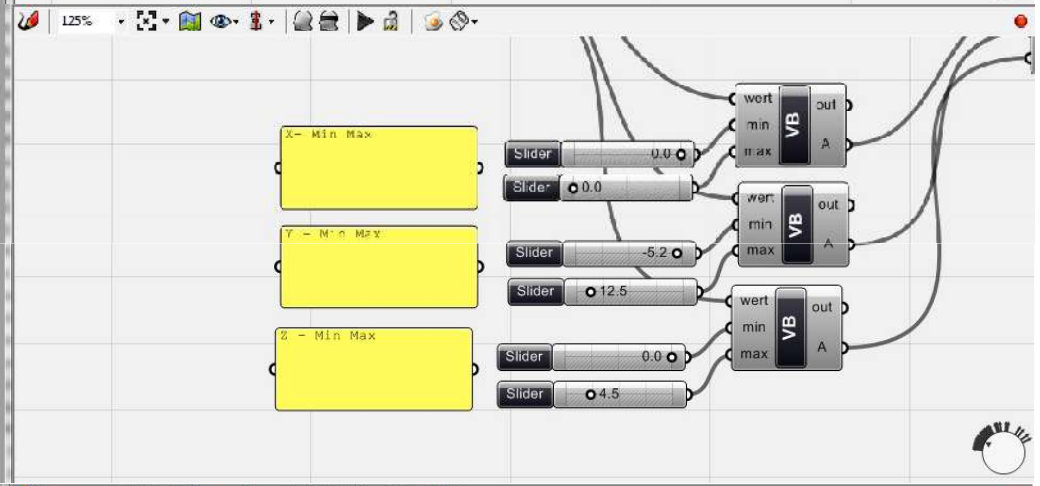
-23.2
VB
wert
min
max
out
A
Pt
X
Y
Z




125%
X- Min Max
Y - Min Max
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-5.2
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wert
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max
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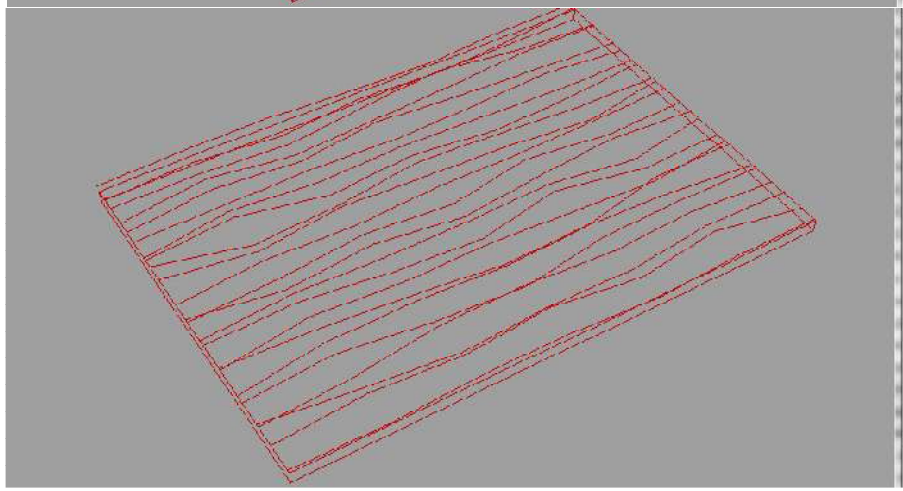
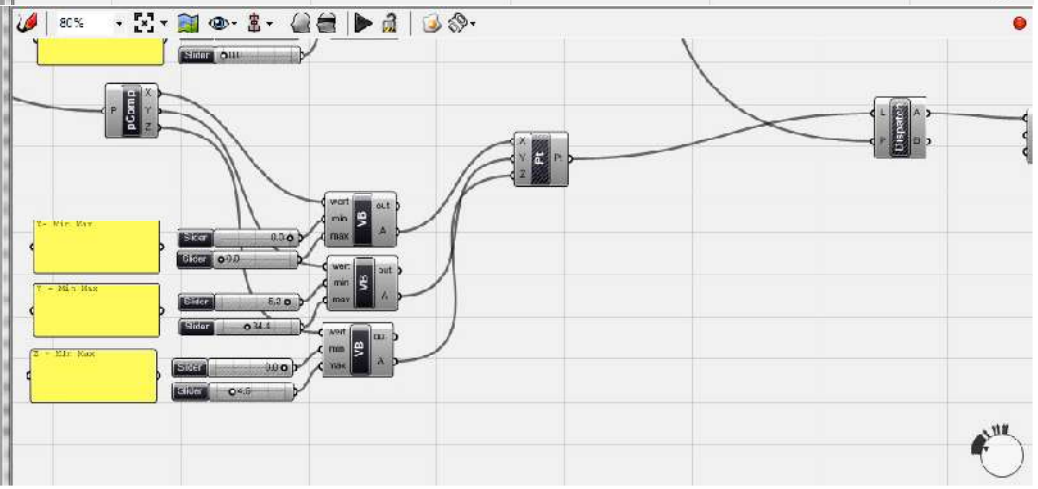
A

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Slider
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min
max
out
A
Pt
X
Y
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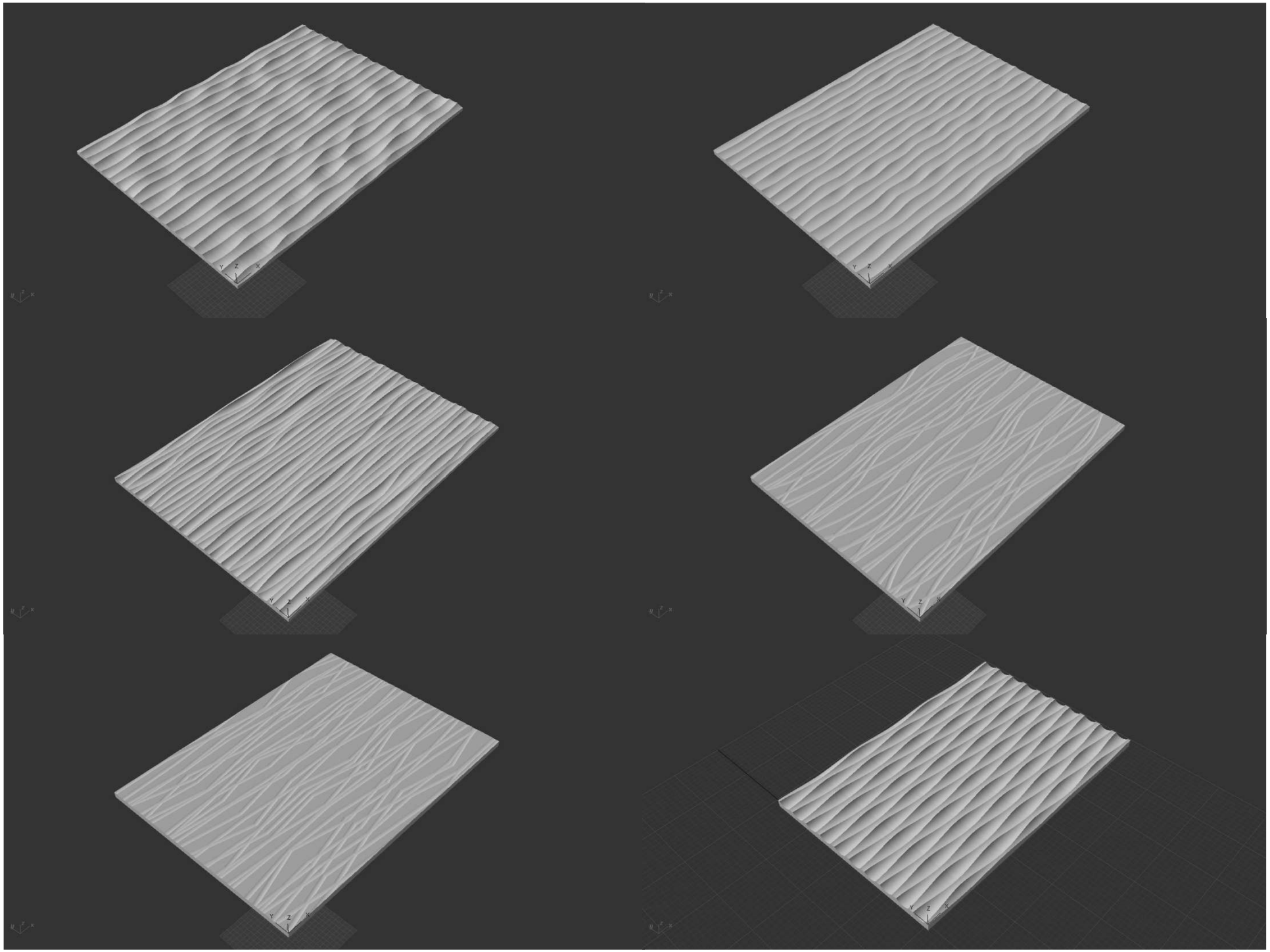
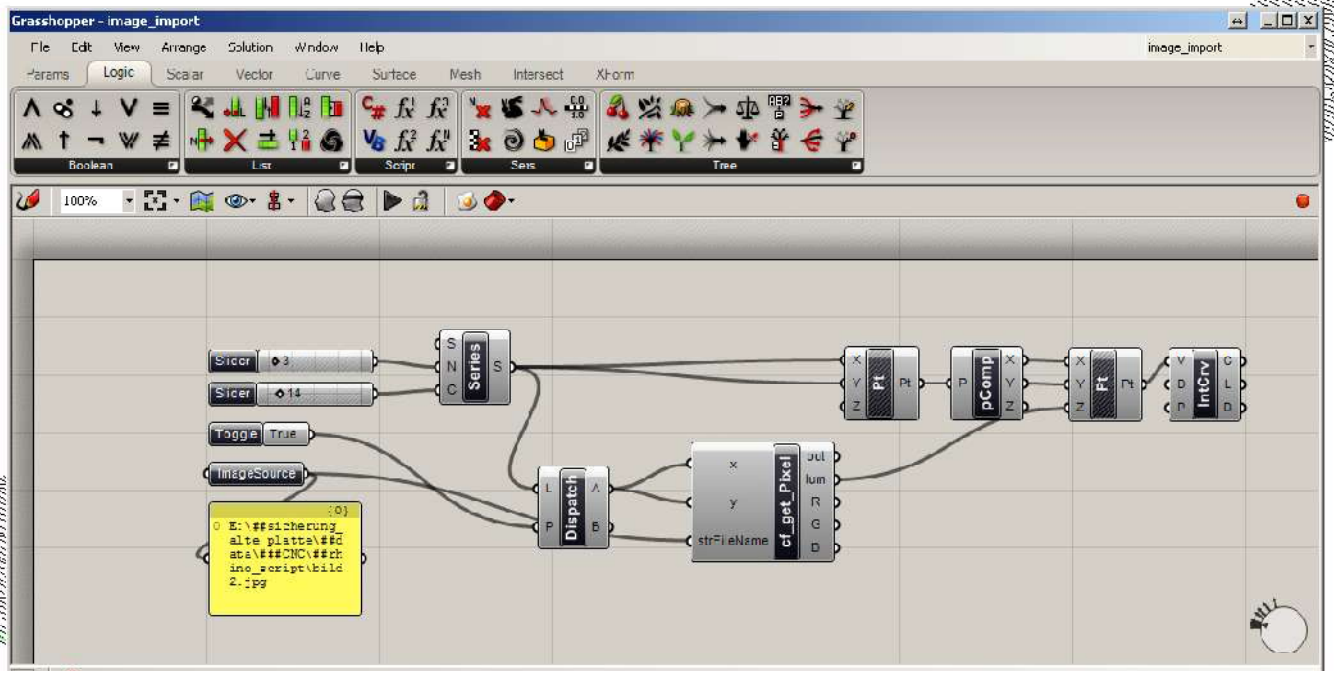
Dispatch



CNC Curve Patterns II

Experiment 2009

Parametrische Modelle (Grasshopper)


Grasshopper - image_import
File Edit View Arrange Solution Window Help
image_import
Params Logic Scalar Vector Curve Surface Mesh Intersect Xform
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List
Script
Sets
Tree
100%
Slider
Slider
Toggle
True
ImageSource
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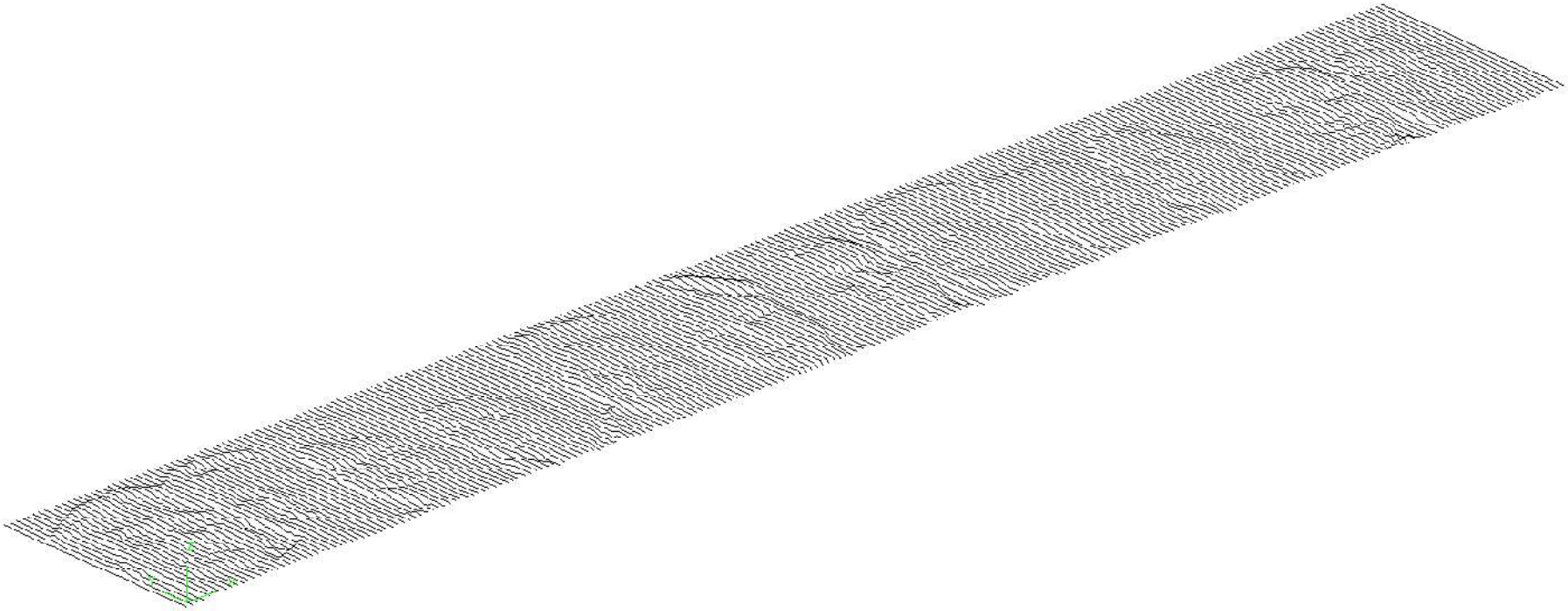
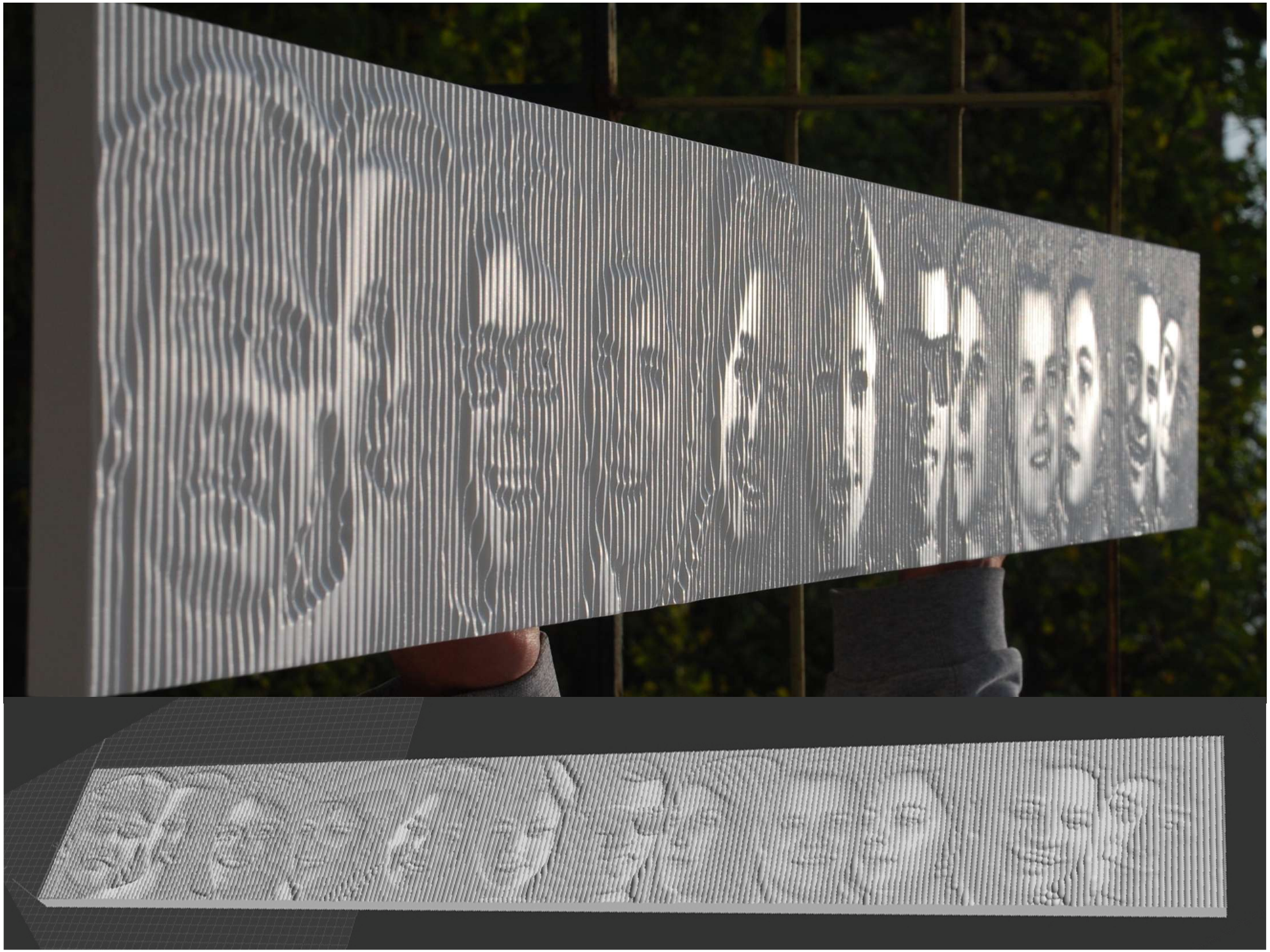
strFileName
Pt
pCamp
IntCrv

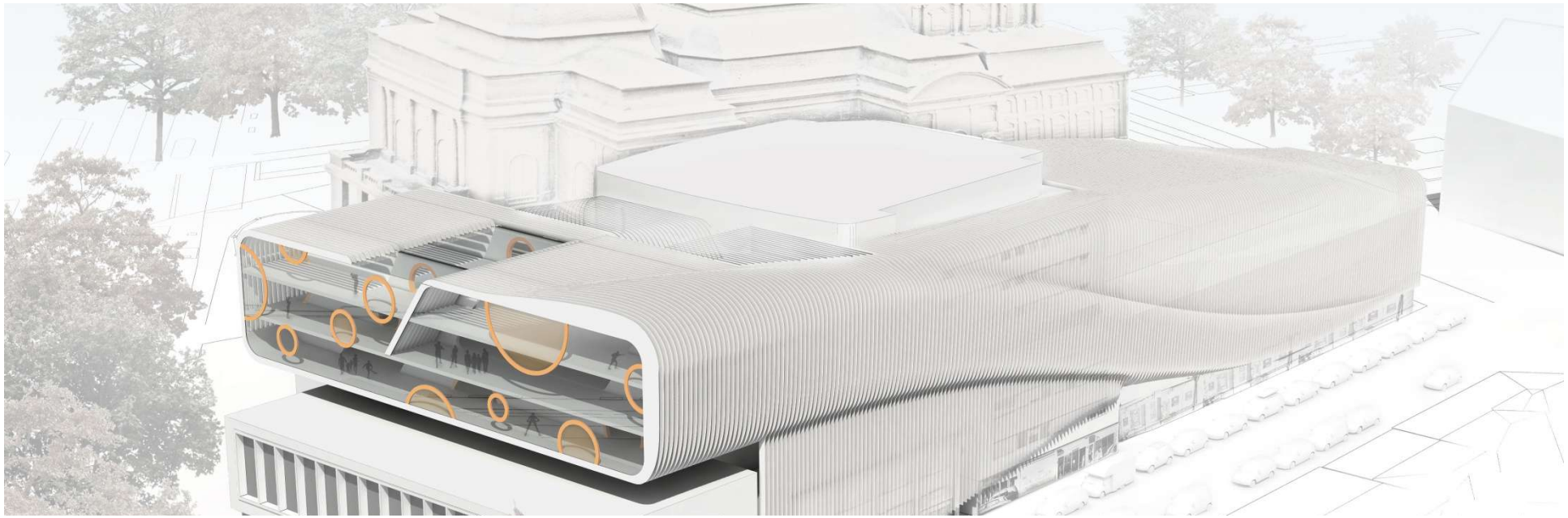


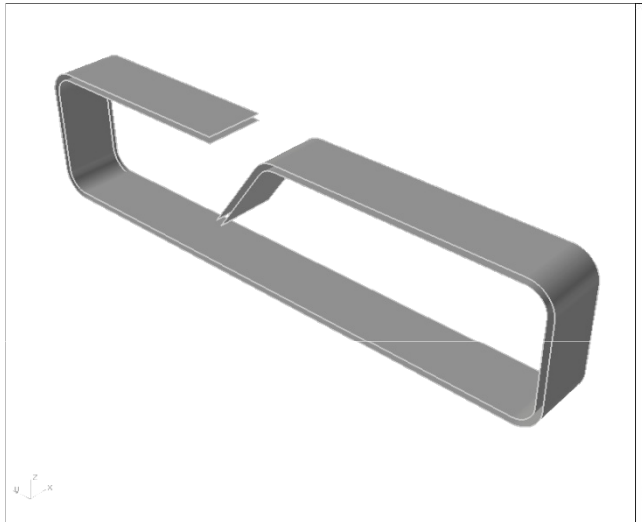


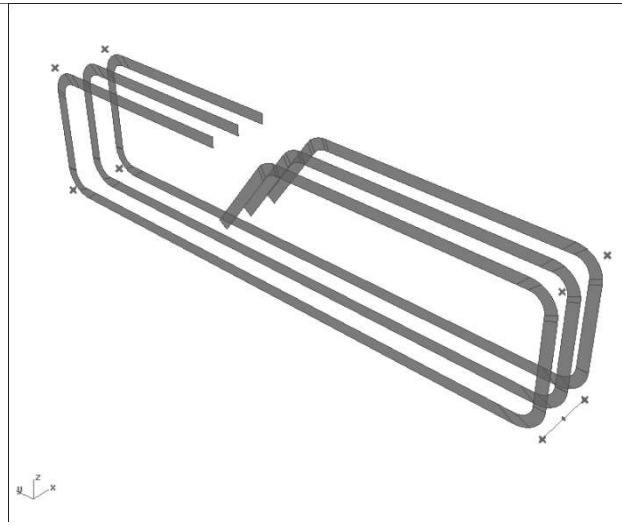
Thalia Neu - Graz

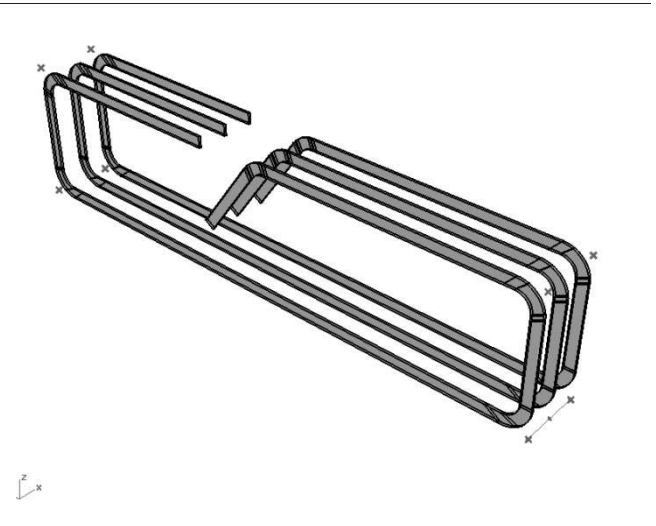
Wettbewerb 2009
Zusammenarbeit mit:
HOFRICHTER-RITTER Architekten ZT GmbH

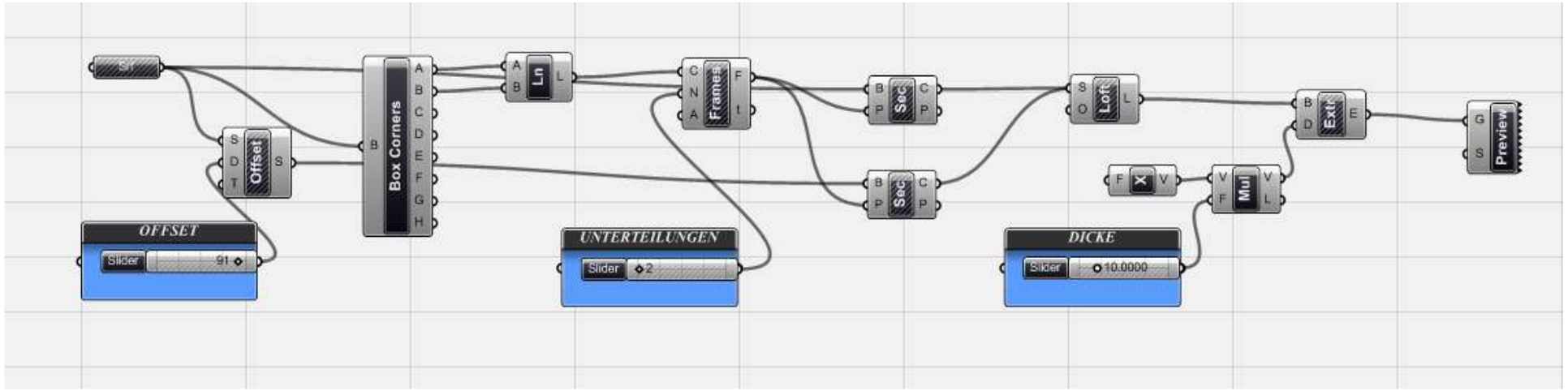
3d Modell | Parametrisches Modell (Grasshopper)

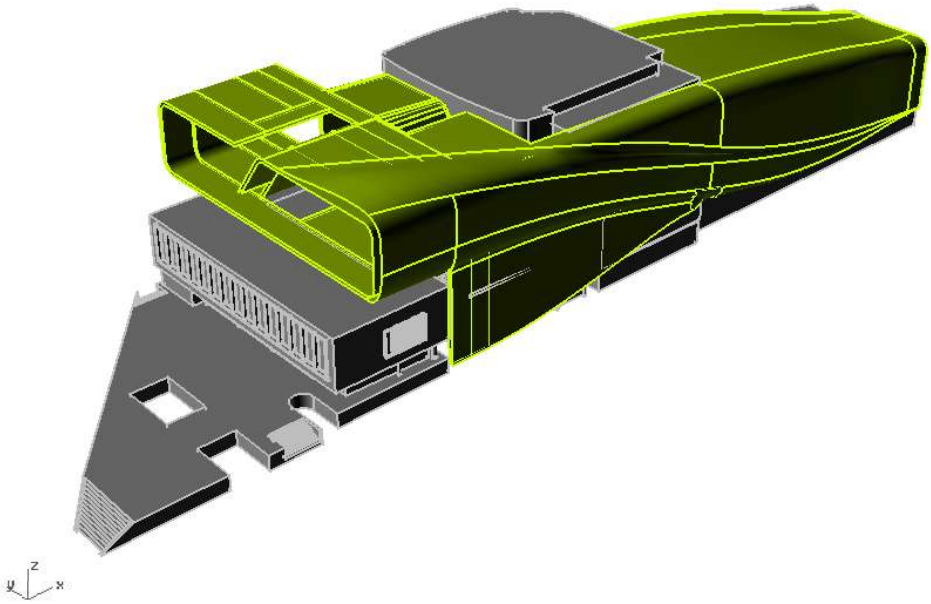


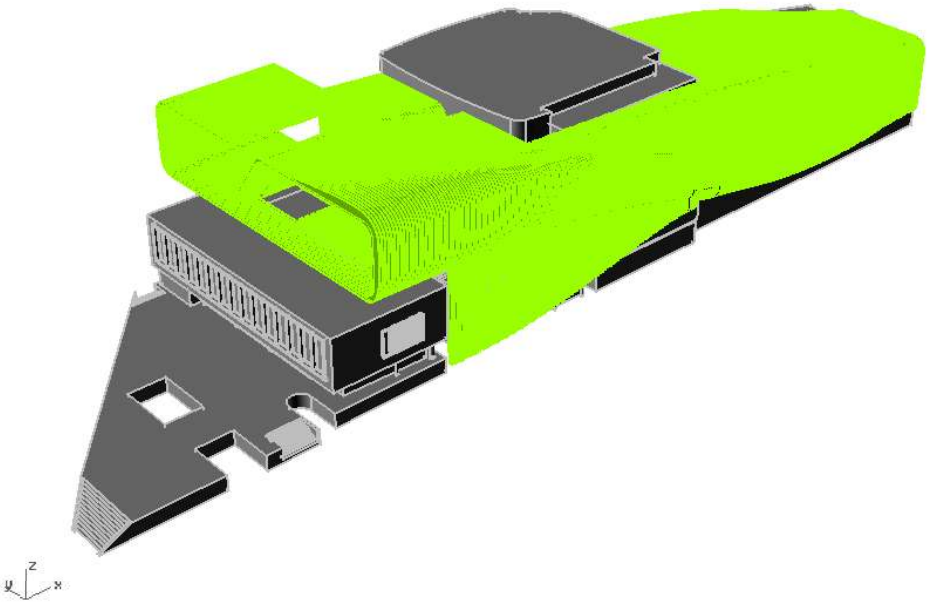


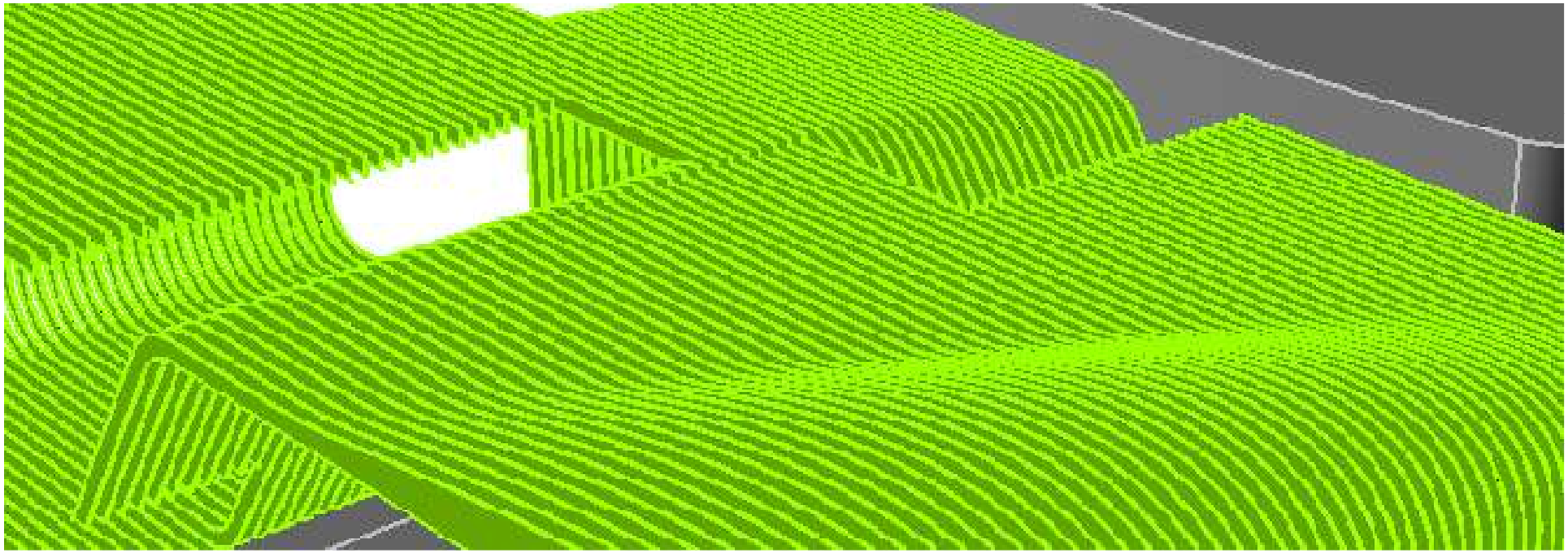


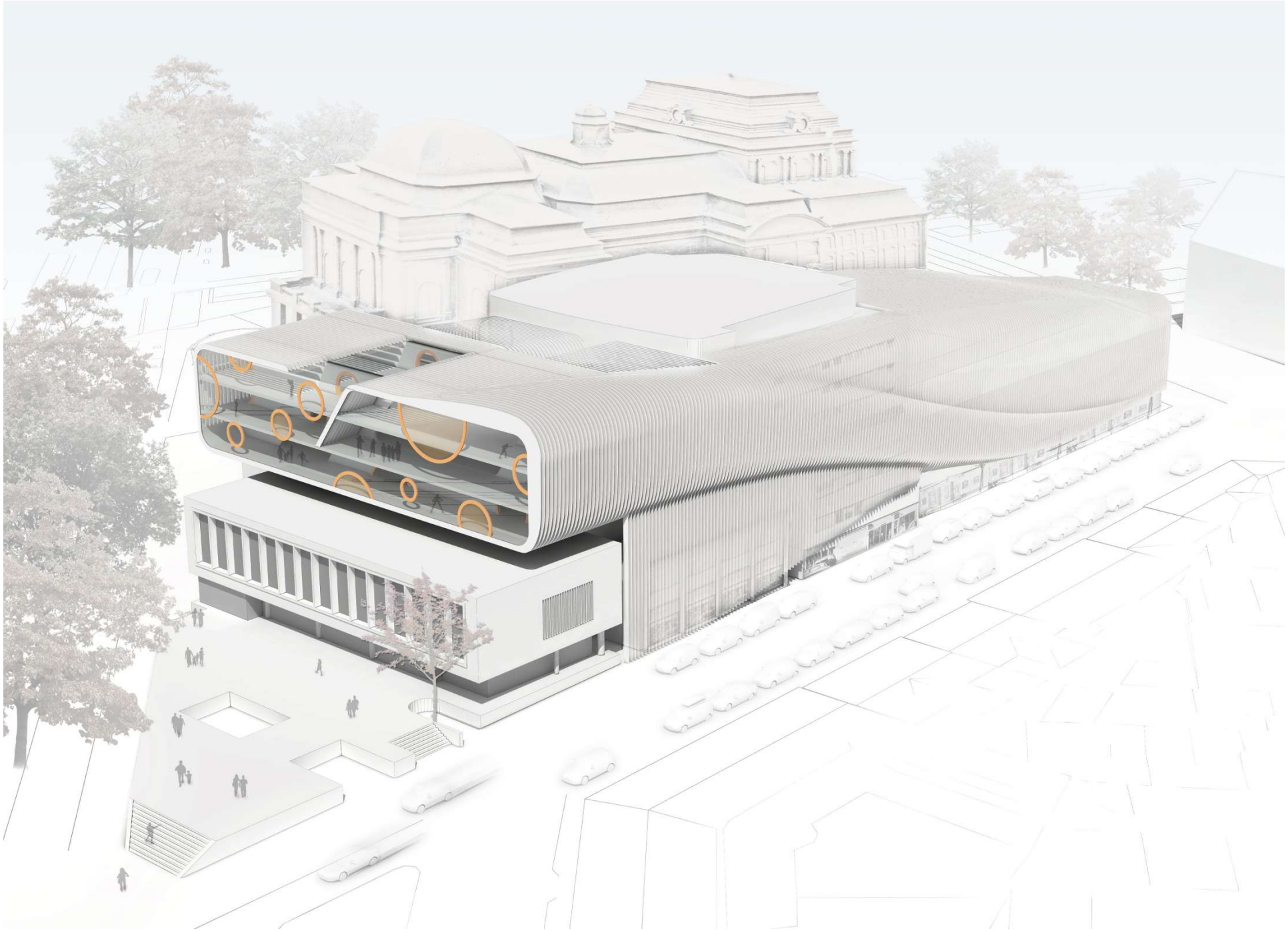



Offset
Box Corners
Ln
Frames
Sec
Sec
Loft
Extr
Mul
Preview
OFFSET
Slider
91
UNTERTEILUNGEN
Slider
2
DICKE
Slider
10.0000

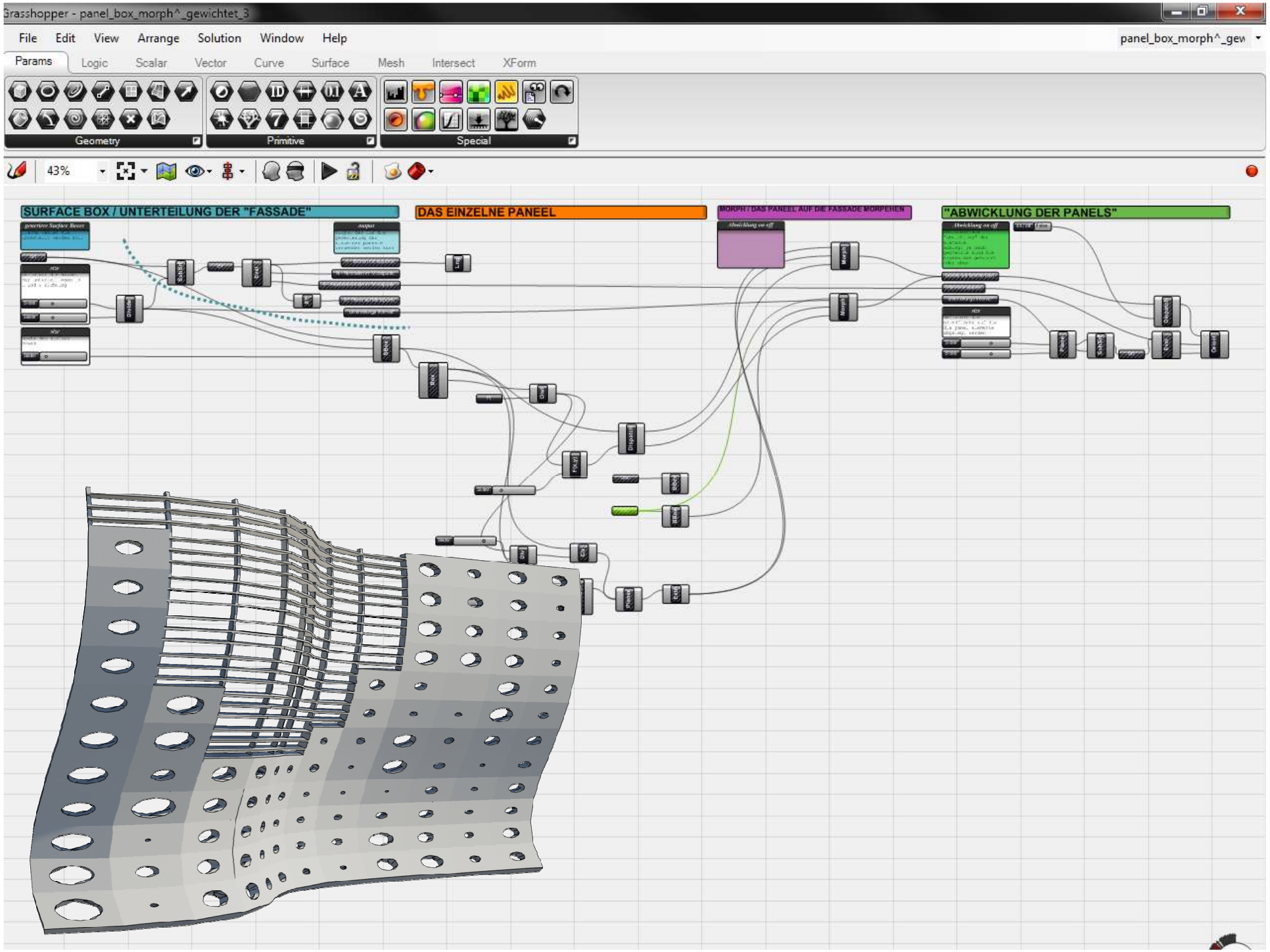








Digitale Fabrikation WS09

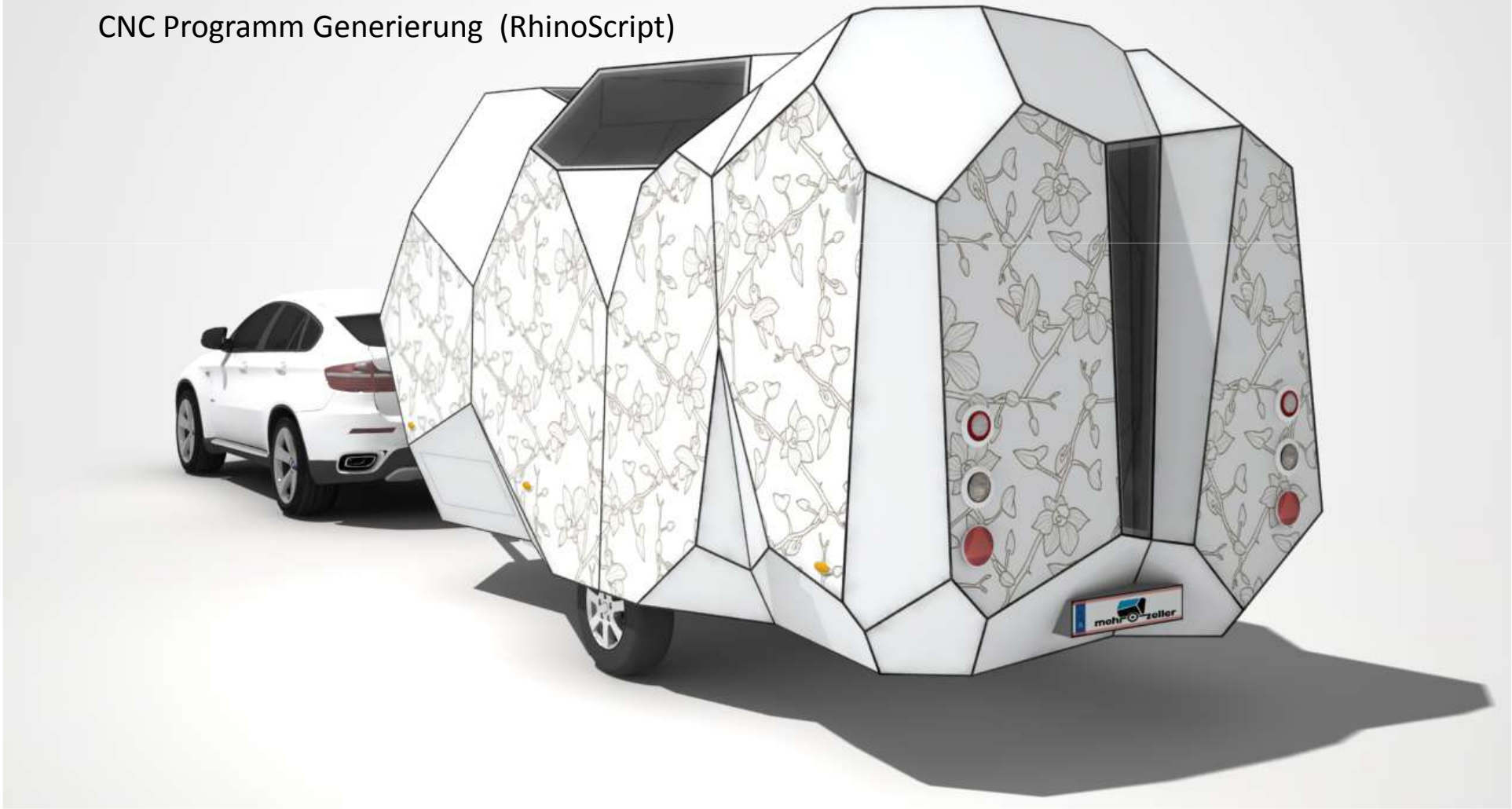

Grasshopper - panel_box_morph^_gewichtet_3
File
Edit
View
Arrange
Solution
Window
Help
panel_box_morph^_gew
Params
Logic
Scalar
Vector
Curve
Surface
Mesh
Intersect
XForm
Geometry
Primitive
Special
43%
SURFACE BOX / UNTERTEILUNG DER "FASSADE"
DAS EINZELNE PANEEL
MORPH / DAS PANEEL AUF DIE FASSADE MORPHEN
"ABWICKLUNG DER PANELS"

Mehrzeller

Diplomarbeit 2008 – Theresa Kalteis – Christian Freissling

Parametrisches Modell (RhinoScript)

CNC Programm Generierung (RhinoScript)



mehr zeller

STARTSEITE | REGISTRIEREN | SUCHEN | MEIN PROFIL
KONFIGURATOR | VERANSTALTUNGEN | INFO | AUSLOGGEN

DEUTSCH

ANGEMELDET
mehrzeller_fan

PUNKTESTAND
54

BENUTZER ONLINE
142

KONFIGURATOR STARTEN

VORKONFIGURIERTE OBJEKTE

MOBILES WOHNEN
5 Modelle

MOBILES ARBEITEN
7 Modelle

PROMOTIONFAHRZEUG
3 Modelle

VIP-LOUNGE
4 Modelle

mehr zeller

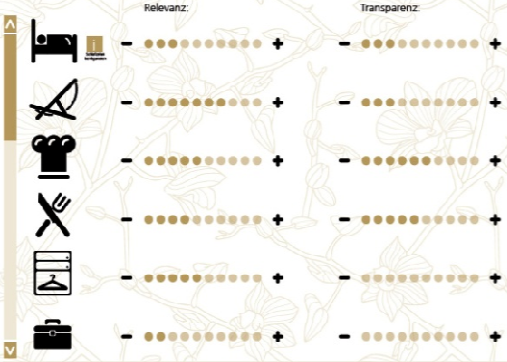
1. PERSONEN

Schieben Sie die Anzahl der gewünschten Personen und Tiere, für die Ihr Mehrzeller gebaut werden soll, in das linke Feld.

2. RAUMZELLEN
3. NUTZUNGSDIAGRAMM
4. 3D DESIGN
5. MATERIALIEN
6. FERTIGSTELLEN

mehr zeller

Relevanz: Transparenz:



Zufallsparameter
Vorgabeparameter

Zufallsparameter
Vorgabeparameter

1. PERSONEN
2. RAUMZELLEN

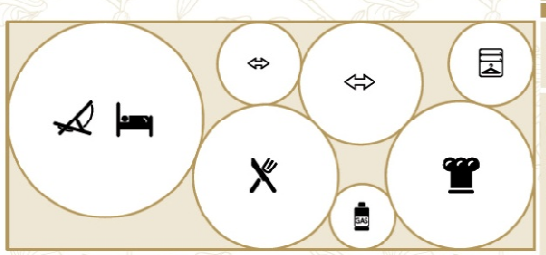
Schieben Sie Ihre gewünschten Raumnutzungen und Zusatzkomponenten in das linke Feld. Definieren Sie durch Verschieben der Regler die Relevanz der Raumfunktion und die Transparenz zum Außenraum.

schlafen
essen
kochen
arbeiten
entspannen
feiern
aufbewahren geschlossen
aufbewahren offen
waschen
duschen
entleeren

TV - Gerät
Außenzelt anbaubar
Stauraum außen

3. NUTZUNGSDIAGRAMM
4. 3D DESIGN
5. MATERIALIEN
6. FERTIGSTELLEN

mehr zeller



ÜBERNEHMEN

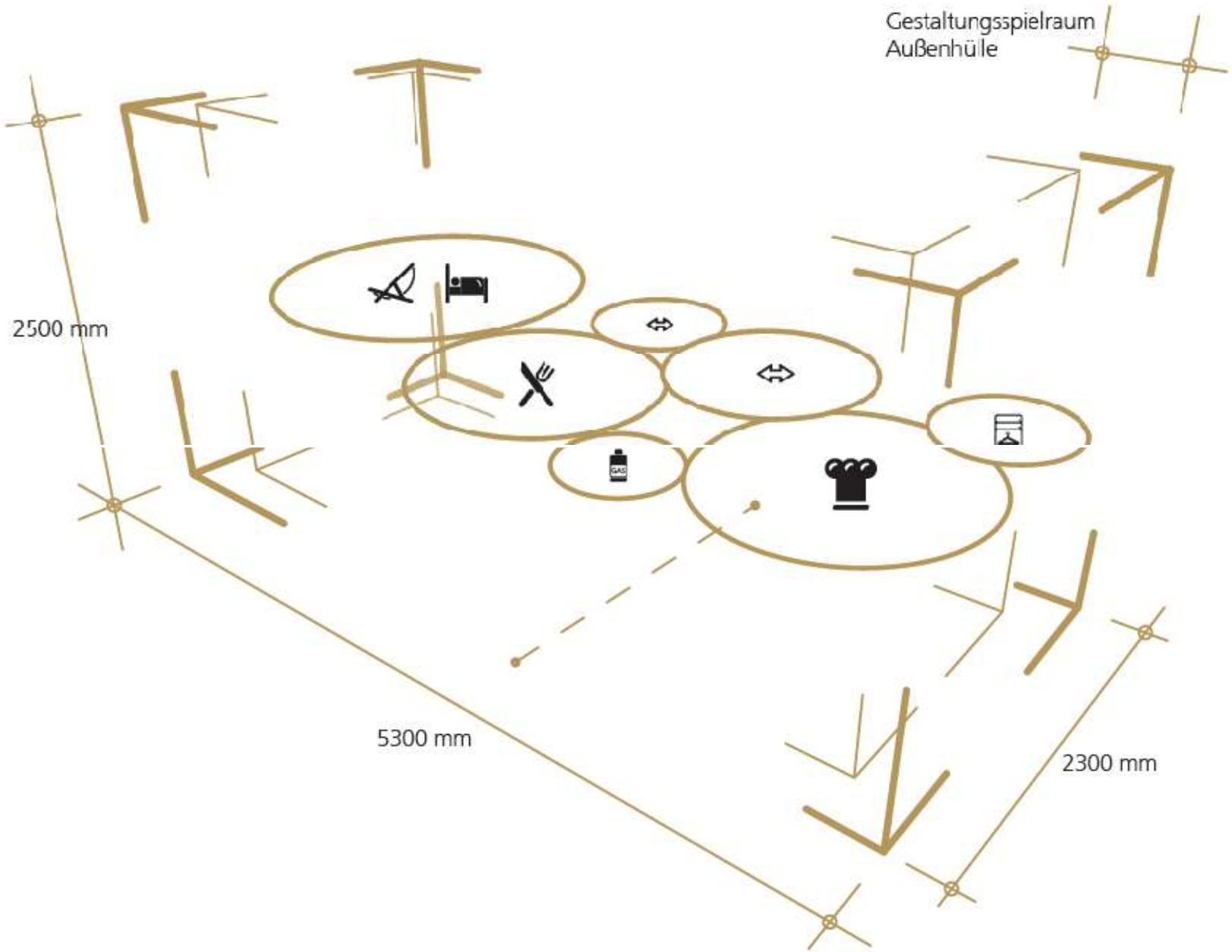
Wachstum erneut starten

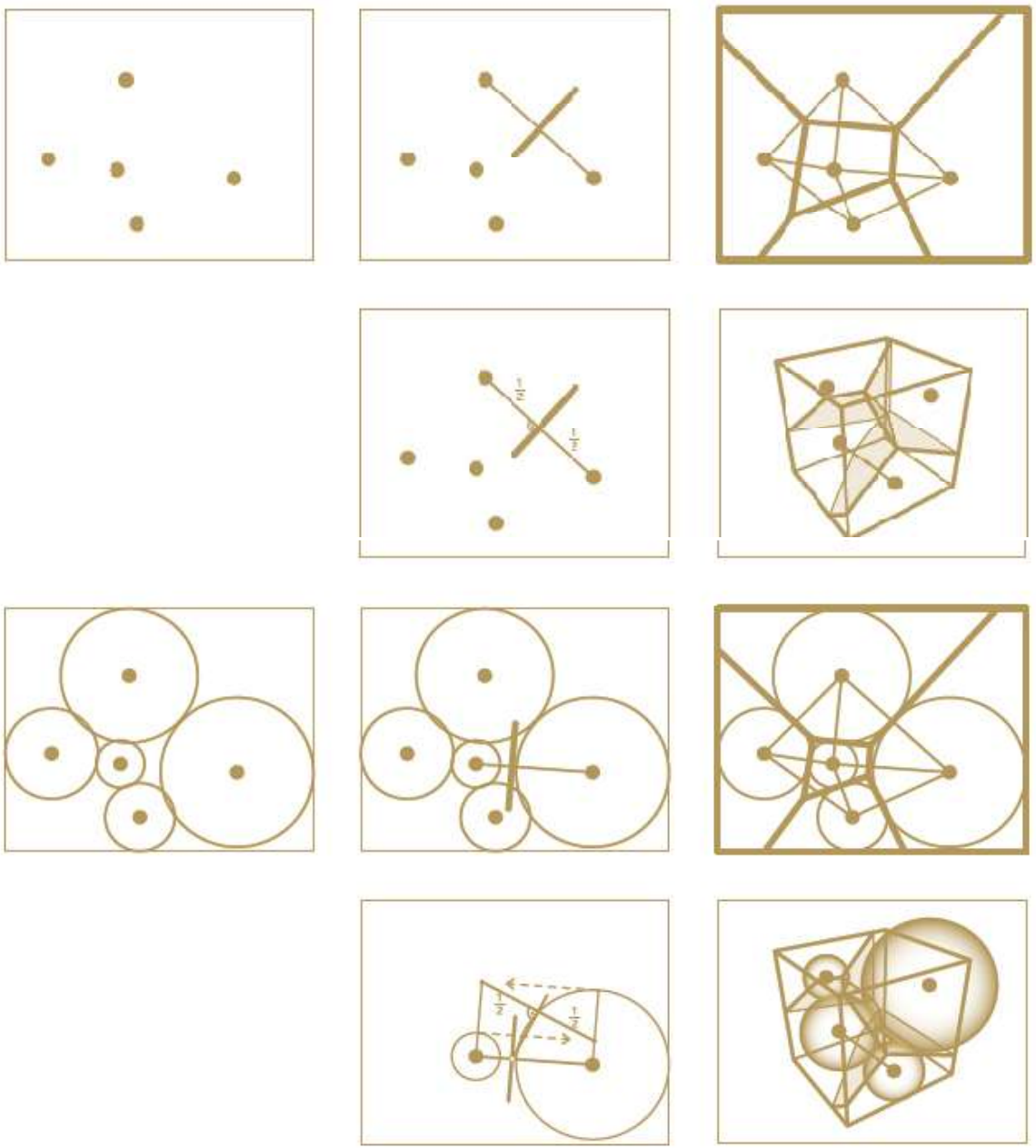
1. PERSONEN
2. RAUMZELLEN
3. NUTZUNGSDIAGRAMM

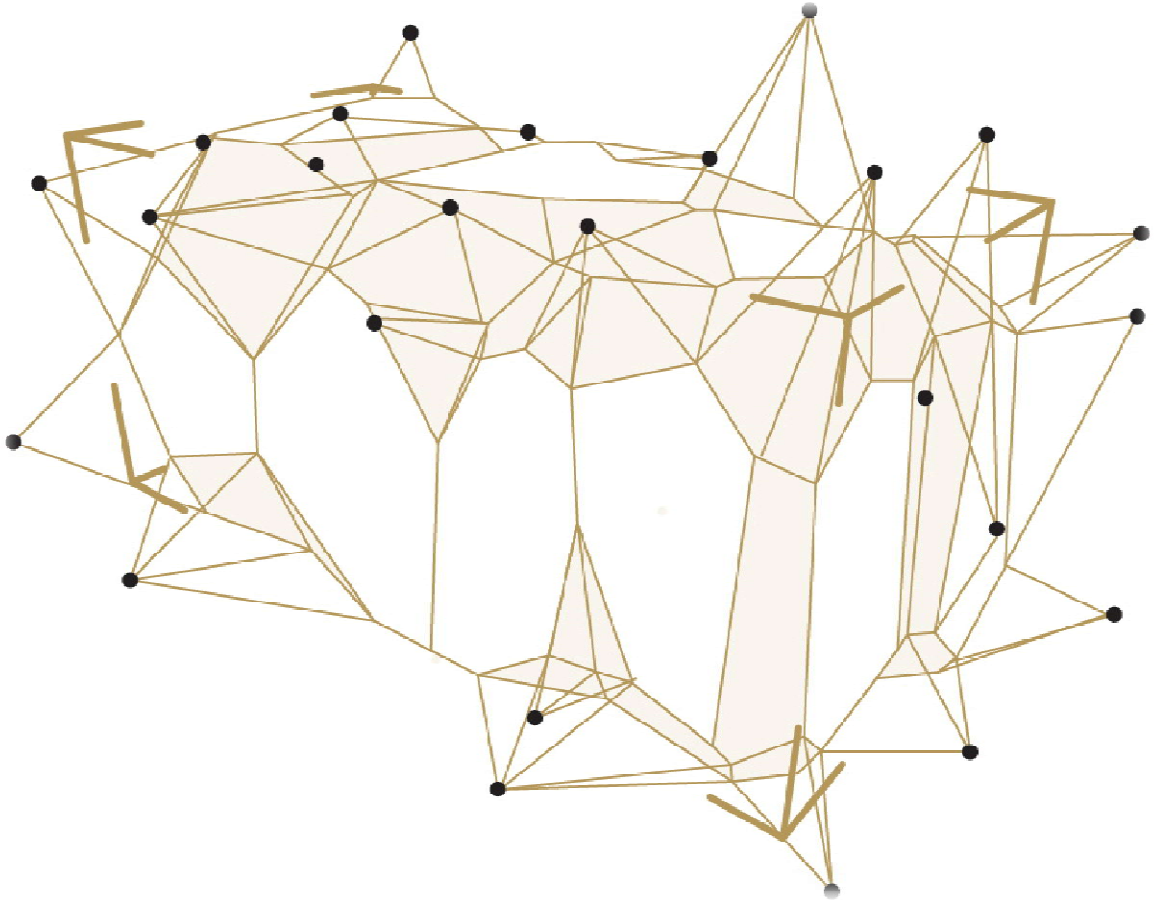
Die Vorkonfiguration ist abgeschlossen. Übernehmen Sie das von Ihnen definierte Nutzungsdiagramm in großflächiger Aufteilung für eine folgende 3D Konfiguration.

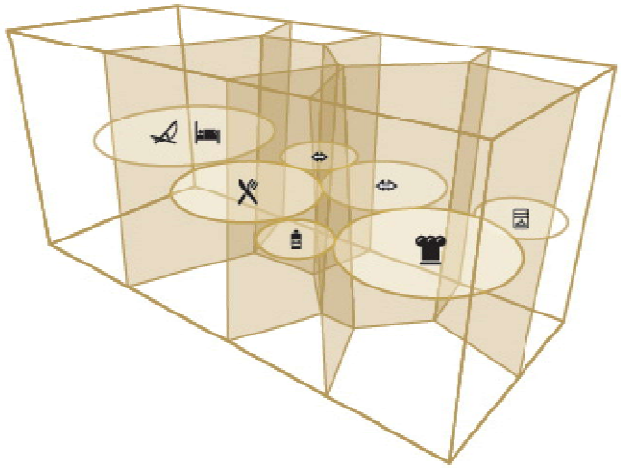
essen
kochen
entspannen
schlafen
aufbewahren geschlossen
Freibereich
Gaskasten

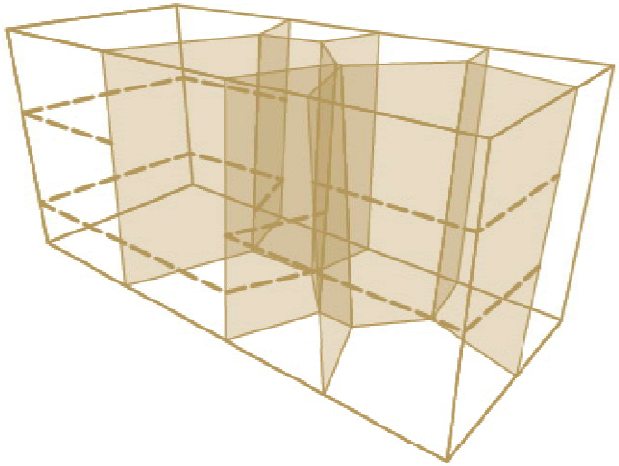
4. 3D DESIGN
5. MATERIALIEN
6. FERTIGSTELLEN

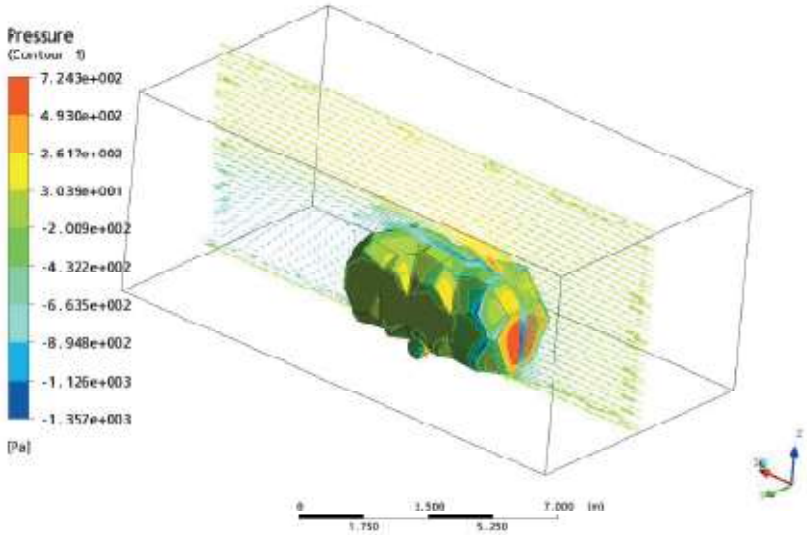

Gestaltungsspielraum
Außenhülle
2500 mm
5300 mm
2300 mm
GAS

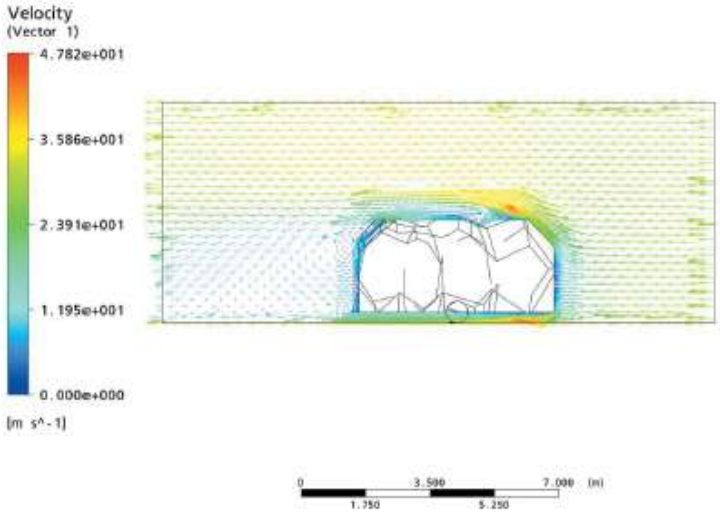

$\frac{1}{2}$
$\frac{1}{2}$
$\frac{1}{2}$
$\frac{1}{2}$

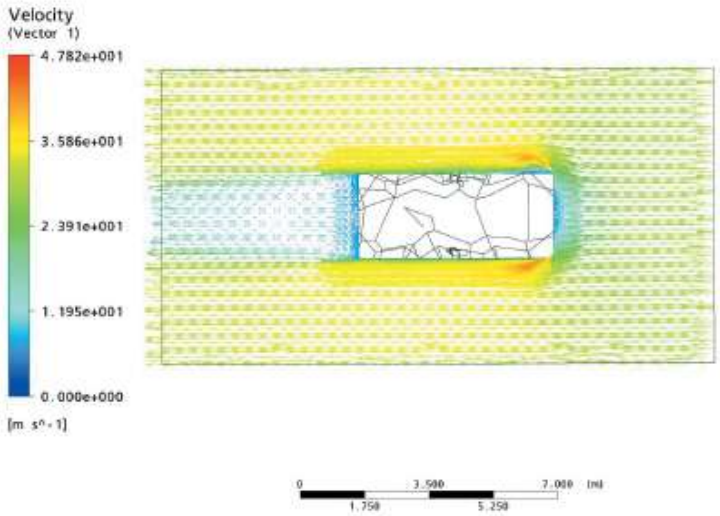






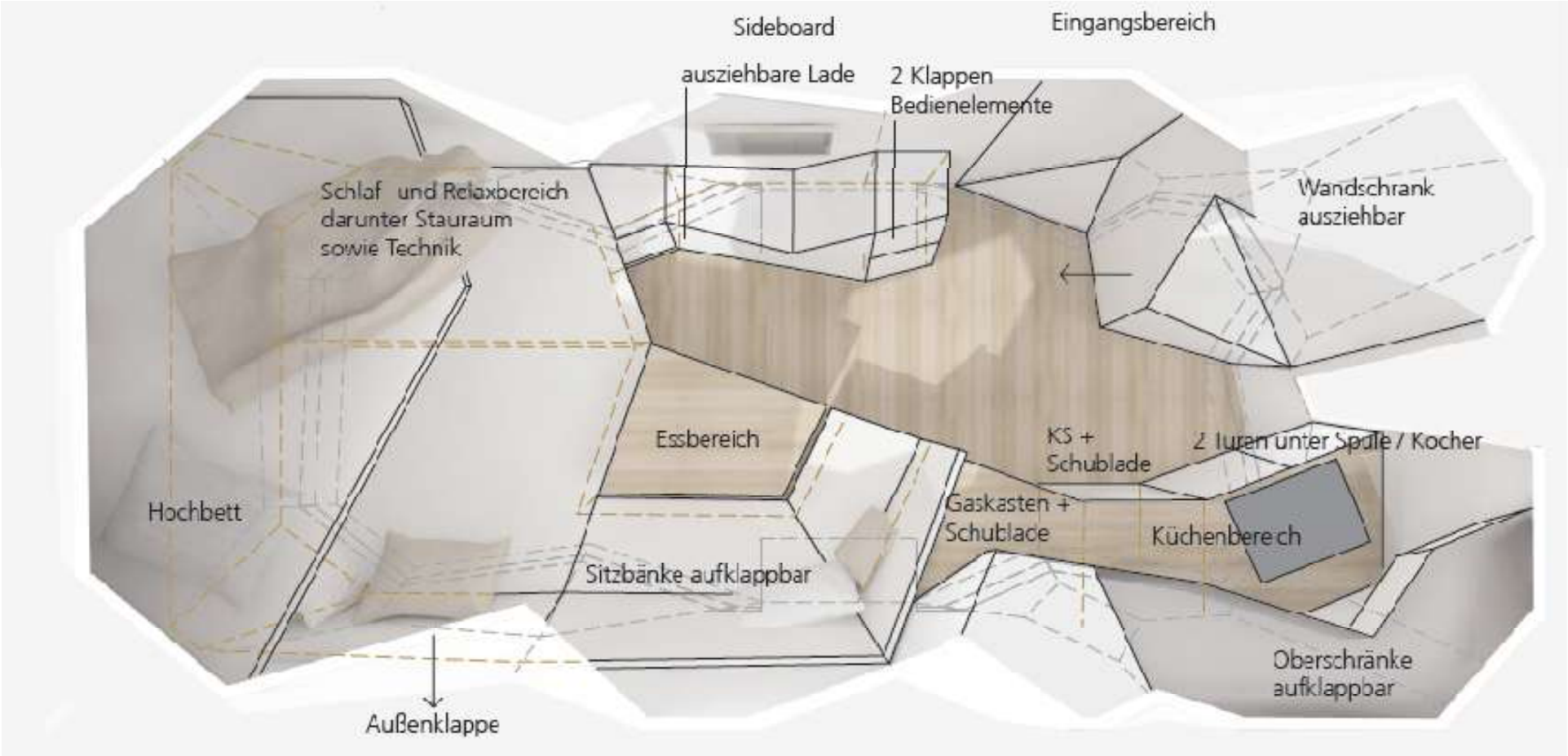

Pressure
(Contour 1)
7.243e+002
4.930e+002
2.617e+002
3.039e+001
-2.009e+002
-4.322e+002
-6.635e+002
-8.948e+002
-1.126e+003
-1.357e+003
[Pa]
0
3.500
7.000 (m)
1.750
5.250

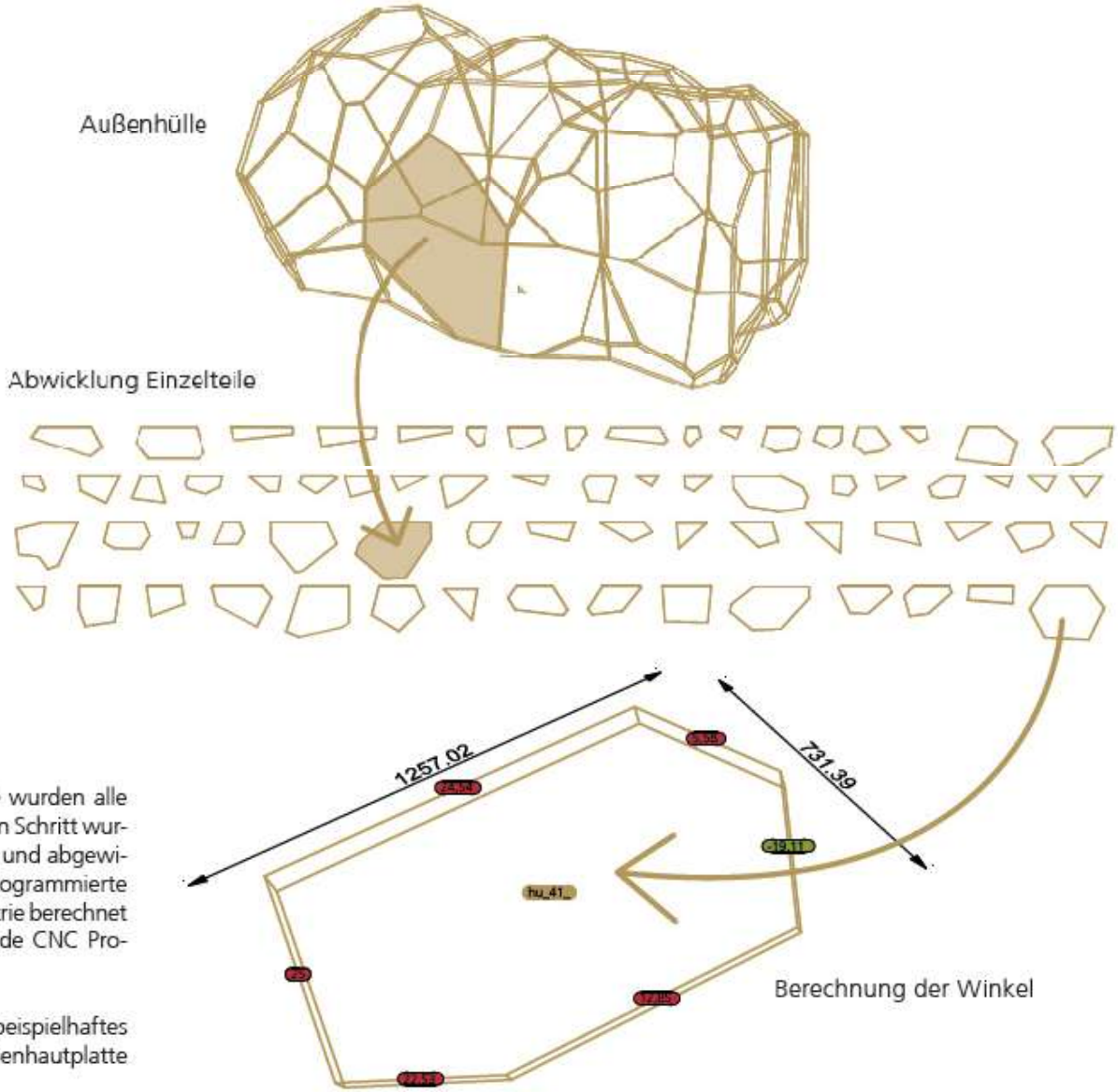

Velocity
(Vector 1)
4.782e+001
3.586e+001
2.391e+001
1.195e+001
0.000e+000
[m s^-1]
0
3.500
7.000 (m)
1.750
5.250


Velocity
(Vector 1)
4.782e+001
3.586e+001
2.391e+001
1.195e+001
0.000e+000
[m s^-1]
0
3.500
7.000 (m)
1.750
5.250

mehr zeller
1. PERSONEN
2. RAUMZELLEN
3. NUTZUNGSDIAGRAMM
4. 3D DESIGN
Die 3D Configuration wurde im Innen- und Außenbereich für Sie erstellt.
Mit Hilfe des Navigators nutzen Sie den 360° Modus für die Bewegung im Objekt.
Innenraum
essen
kochen
entspannen
schlafen
aufbewahren geschlossen
Feiberich
Gaskasten
5. MATERIALIEN
6. FERTIGSTELLEN
neu generieren

mehr zeller
1. PERSONEN
2. RAUMZELLEN
3. NUTZUNGSDIAGRAMM
4. 3D DESIGN
5. MATERIALIEN
Wählen Sie aus der Liste Materialien und farben und ziehen diese über das ausgewählte Objekt.
Außen
- Farbe Außenhaut
- Muster Beklebung
Innen
- Boden
6. FERTIGSTELLEN


Sideboard
Eingangsbereich
ausziehbare Lade
2 Klappen
Bedienelemente
Schlaf und Relaxbereich
darunter Stauraum
sowie Technik
Wandschrank
ausziehbar
Essbereich
KS +
Schublade
2 Iuren unter Spüle / Kocher
Hochbett
Gaskasten +
Schublade
Küchenbereich
Sitzbänke aufklappbar
Oberschränke
aufklappbar
Außenklappe



Für die weitere Produktion der Außenhülle wurden alle CNC Daten automatisiert generiert. Im ersten Schritt wurde die Hülle in einzelne Elemente aufgeteilt und abgewickelt. Durch eigens für diese Anwendung programmierte Scipts werden alle Winkel aus der 3d Geometrie berechnet und anhand dieser Daten das entsprechende CNC Programm erstellt.

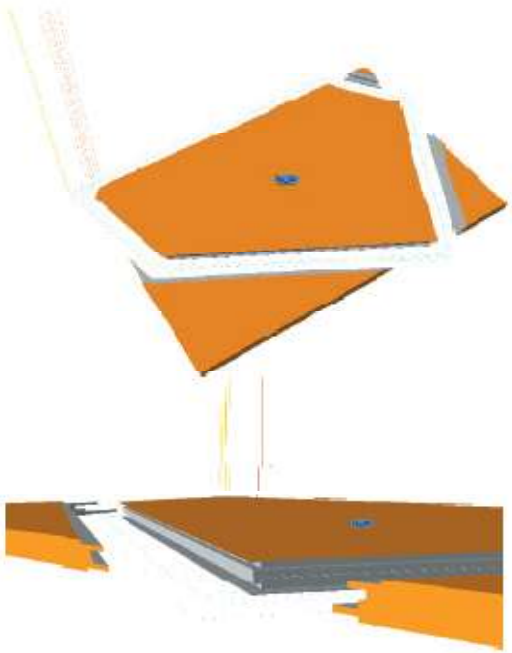
Die Abbildung auf der rechten Sei zeigt ein beispielhaftes NC Programm für die Erstellung einer Außenhautplatte samt Voransicht.

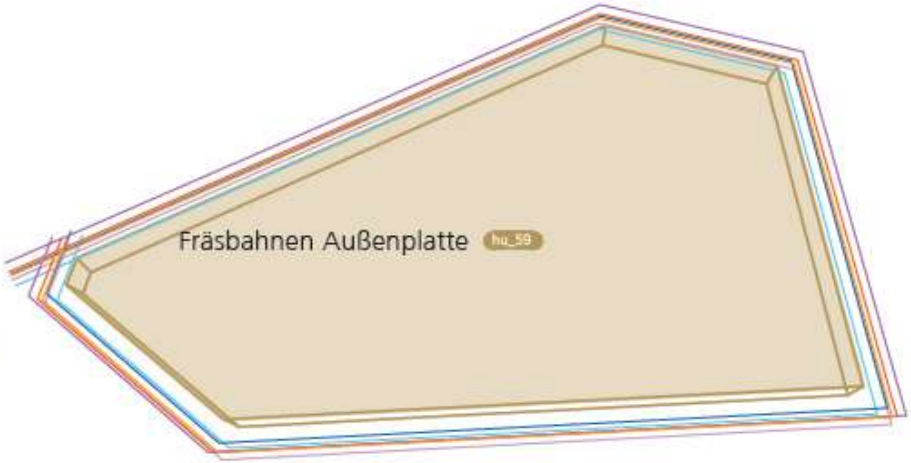
Automatisch generiertes CNC Programm einer Außenhüllenplatte

```
H DX=1645.581 DY=1122.2 DZ=40. -AD C=0 T=0 R=1 *MM /"def.tlg" BX=2
BY=2 BZ=0
SY=1 M=0
G0 X=-11.145 Y=1075.504 Z=-2 T=101
G1 X=-11.145 Y=1075.504 Z=43
G1 X=-10.844 Y=1075.886 Z=43
G1 X=37.837 Y=1131.769 Z=43
G1 X=38.492 Y=1132.454 Z=43
G1 X=39.212 Y=1133.074 Z=43
G1 X=39.986 Y=1133.622 Z=43
G1 X=40.808 Y=1134.095 Z=43
G1 X=41.672 Y=1134.488 Z=43
G1 X=42.569 Y=1134.798 Z=43
G1 X=43.491 Y=1135.021 Z=43
G1 X=44.43 Y=1135.155 Z=43
G1 X=45.376 Y=1135.2 Z=43
G1 X=1388.787 Y=1135.2 Z=43
G1 X=1389.673 Y=1135.161 Z=43
G1 X=1390.553 Y=1135.043 Z=43
G1 X=1391.418 Y=1134.848 Z=43
G1 X=1392.263 Y=1134.577 Z=43
G1 X=1393.08 Y=1134.232 Z=43
G1 X=1393.864 Y=1133.816 Z=43
G1 X=1394.608 Y=1133.332 Z=43
G1 X=1395.306 Y=1132.784 Z=43
G1 X=1395.952 Y=1132.176 Z=43
G1 X=1396.542 Y=1131.513 Z=43
G1 X=1656.899 Y=811.658 Z=43
G1 X=1657.47 Y=810.883 Z=43
G1 X=1657.964 Y=810.056 Z=43
G1 X=1658.376 Y=809.186 Z=43
G1 X=1658.703 Y=808.281 Z=43
G1 X=1658.941 Y=807.348 Z=43
G1 X=1659.088 Y=806.396 Z=43
G1 X=1659.143 Y=805.435 Z=43
G1 X=1659.105 Y=804.473 Z=43
G1 X=1658.975 Y=803.519 Z=43
G1 X=1658.754 Y=802.582 Z=43
G1 X=1658.443 Y=801.67 Z=43
G1 X=1658.047 Y=800.793 Z=43
G1 X=1244.207 Y=-8.641 Z=43
G1 X=1243.711 Y=-9.502 Z=43
G1 X=1243.133 Y=-10.309 Z=43
G1 X=1242.477 Y=-11.055 Z=43
G1 X=1241.75 Y=-11.733 Z=43
G1 X=1240.96 Y=-12.335 Z=43
G1 X=1240.114 Y=-12.855 Z=43
G1 X=1239.221 Y=-13.289 Z=43
G1 X=1238.288 Y=-13.632 Z=43
G1 X=1237.327 Y=-13.882 Z=43
G1 X=1236.345 Y=-14.034 Z=43
G1 X=1235.353 Y=-14.088 Z=43
G1 X=1234.361 Y=-14.044 Z=43
G1 X=1233.378 Y=-13.901 Z=43
G1 X=1232.414 Y=-13.662 Z=43
G1 X=1231.478 Y=-13.328 Z=43
G1 X=1230.58 Y=-12.903 Z=43
```

```
G1 X=116.625 Y=585.87 Z=43
G1 X=116.04 Y=584.338 Z=43
G1 X=115.302 Y=584.876 Z=43
G1 X=114.615 Y=585.479 Z=43
G1 X=113.986 Y=586.142 Z=43
G1 X=113.42 Y=586.859 Z=43
G1 X=112.922 Y=587.626 Z=43
G1 X=112.497 Y=588.434 Z=43
G1 X=112.146 Y=589.278 Z=43
G1 X=111.875 Y=590.151 Z=43
G1 X=-12.978 Y=1066.783 Z=43
G1 X=-13.178 Y=1067.735 Z=43
G1 X=-13.285 Y=1068.701 Z=43
G1 X=-13.298 Y=1069.674 Z=43
G1 X=-13.216 Y=1070.643 Z=43
G1 X=-13.04 Y=1071.599 Z=43
G1 X=-12.773 Y=1072.534 Z=43
G1 X=-12.415 Y=1073.438 Z=43
G1 X=-11.972 Y=1074.304 Z=43
G1 X=-11.447 Y=1075.122 Z=43
G1 X=-11.145 Y=1075.504 Z=43
G1 X=-11.145 Y=1075.504 Z=-2
G0 X=-85. Y=1193.309 Z=-2 T=142
G1 X=-85. Y=1193.309 Z=5
G1 X=1420.515 Y=1193.309 Z=5
G1 X=1729.514 Y=813.695 Z=5
G1 X=1263.788 Y=-97.223 Z=5
G1 X=63.936 Y=545.683 Z=5
G1 X=-77.79 Y=1086.733 Z=5
G1 X=27.153 Y=1207.2 Z=5
G1 X=27.153 Y=1207.2 Z=-2
G0 X=-85. Y=1177.793 Z=-2 T=142
G1 X=-85. Y=1177.793 Z=45
G1 X=1404.78 Y=1177.793 Z=45
G1 X=1704.717 Y=809.312 Z=45
G1 X=1249.438 Y=-81.171 Z=45
G1 X=87.284 Y=541.536 Z=45
G1 X=-53.93 Y=1080.63 Z=45
G1 X=56.329 Y=1207.2 Z=45
G1 X=56.329 Y=1207.2 Z=-2
G0 X=-85. Y=1181.198 Z=-2 T=142
G1 X=-85. Y=1181.198 Z=21.4
G1 X=1412.807 Y=1181.198 Z=21.4
G1 X=1713.662 Y=811.589 Z=21.4
G1 X=1256.991 Y=-81.619 Z=21.4
G1 X=76.536 Y=550.894 Z=21.4
G1 X=-62.877 Y=1083.111 Z=21.4
```

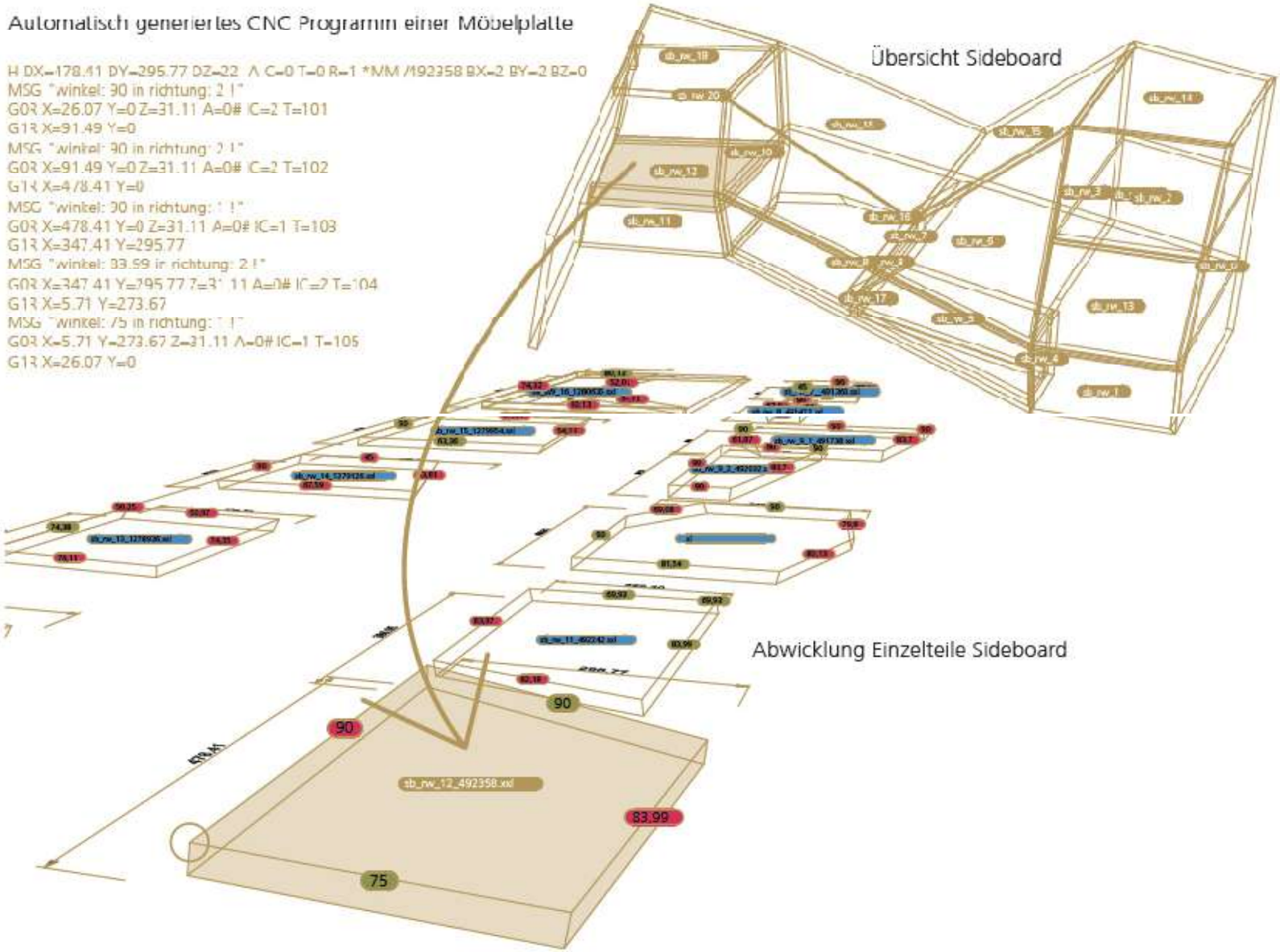
```
G1 X=45.221 Y=1207.2 Z=21.4
G1 X=45.221 Y=1207.2 Z=-2
G0 X=-85. Y=1175.533 Z=-2 T=142
G1 X=-85. Y=1175.533 Z=28.3
G1 X=1407.052 Y=1175.533 Z=28.3
G1 X=1704.608 Y=809.989 Z=28.3
G1 X=1251.751 Y=-75.758 Z=28.3
G1 X=85.06 Y=549.379 Z=28.3
G1 X=-54.165 Y=1080.883 Z=28.3
G1 X=-56.07 Y=1207.426 Z=28.3
G1 X=56.07 Y=1207.426 Z=-2
G0 X=-85. Y=1165.196 Z=-2 T=142
G1 X=-85. Y=1165.196 Z=11.5
G1 X=1402.597 Y=1165.196 Z=11.5
G1 X=1692.698 Y=808.799 Z=11.5
G1 X=1247.985 Y=-61.019 Z=11.5
G1 X=93.714 Y=557.732 Z=11.5
G1 X=-43.152 Y=1073.319 Z=11.5
G1 X=69.12 Y=1207.2 Z=11.5
G1 X=-69.12 Y=1207.2 Z=-2
G0 X=-85. Y=1153.865 Z=-2 T=142
G1 X=-85. Y=1153.865 Z=DZ-1.5
G1 X=1391.107 Y=1153.865 Z=DZ-1.5
G1 X=1674.59 Y=805.598 Z=DZ-1.5
G1 X=1237.507 Y=-49.297 Z=DZ-1.5
G1 X=110.263 Y=554.703 Z=DZ-1.5
G1 X=-25.729 Y=1073.863 Z=DZ-1.5
G1 X=90.425 Y=1207.2 Z=DZ-1.5
G1 X=90.425 Y=1207.2 Z=-2
```

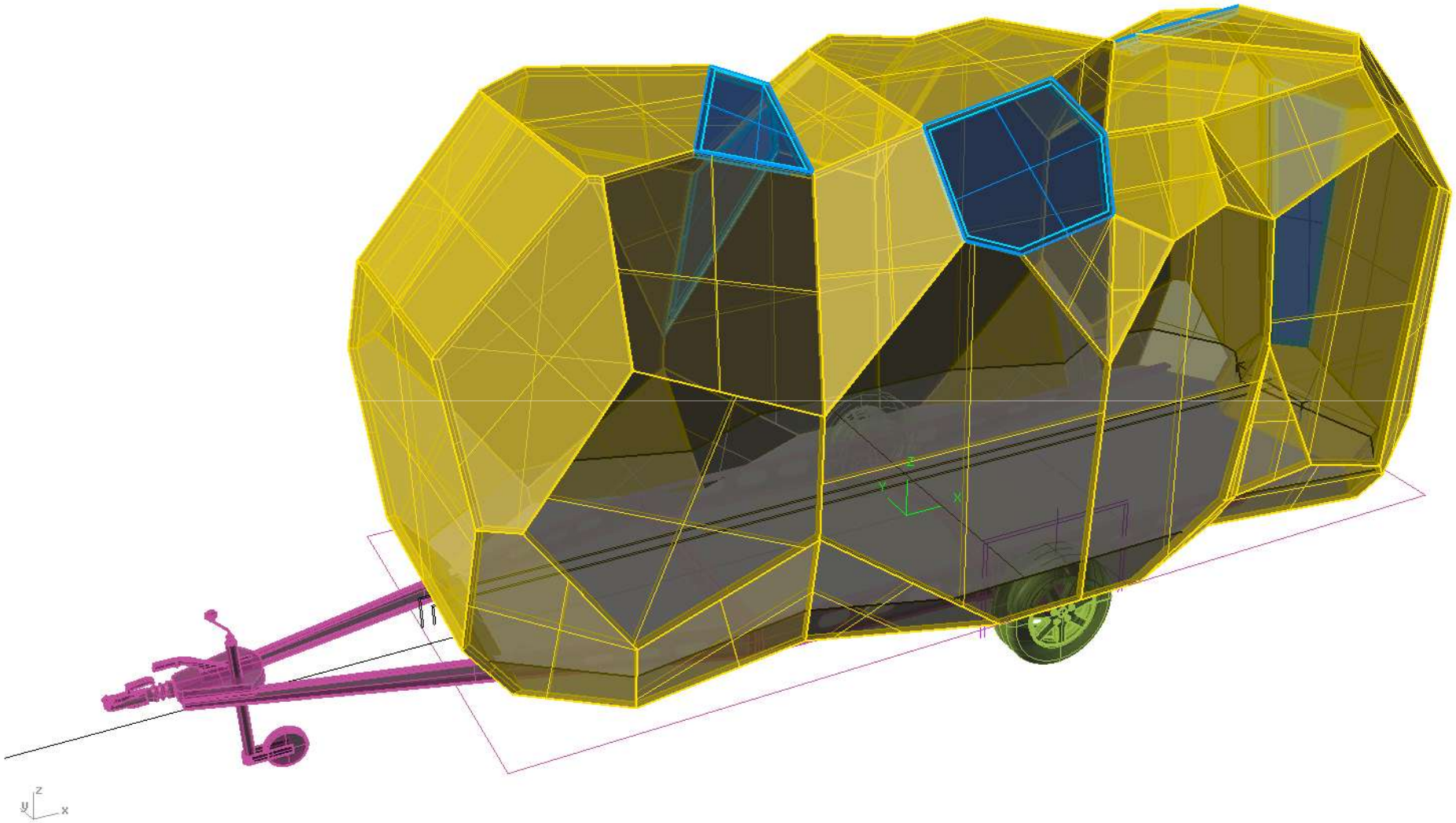


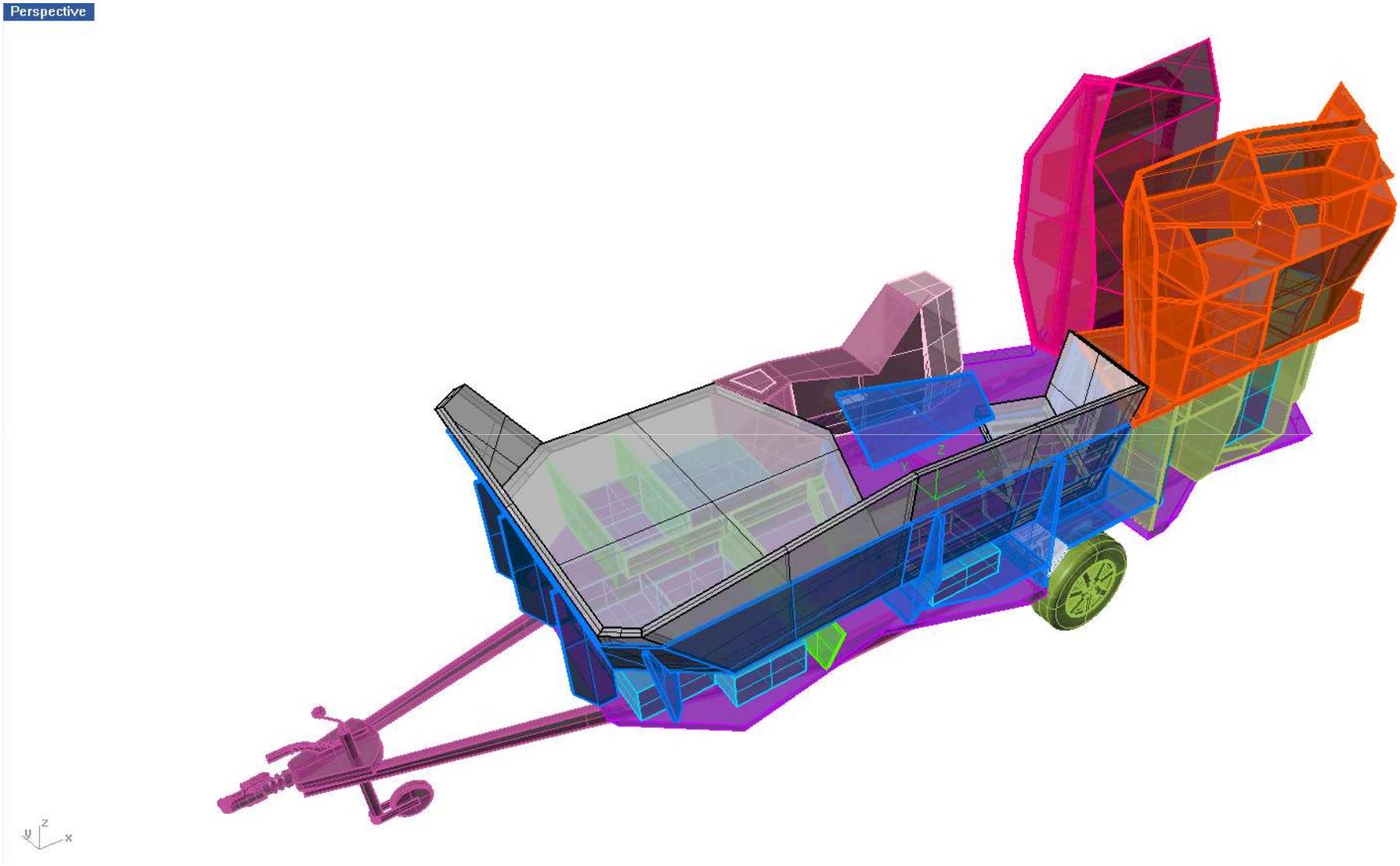


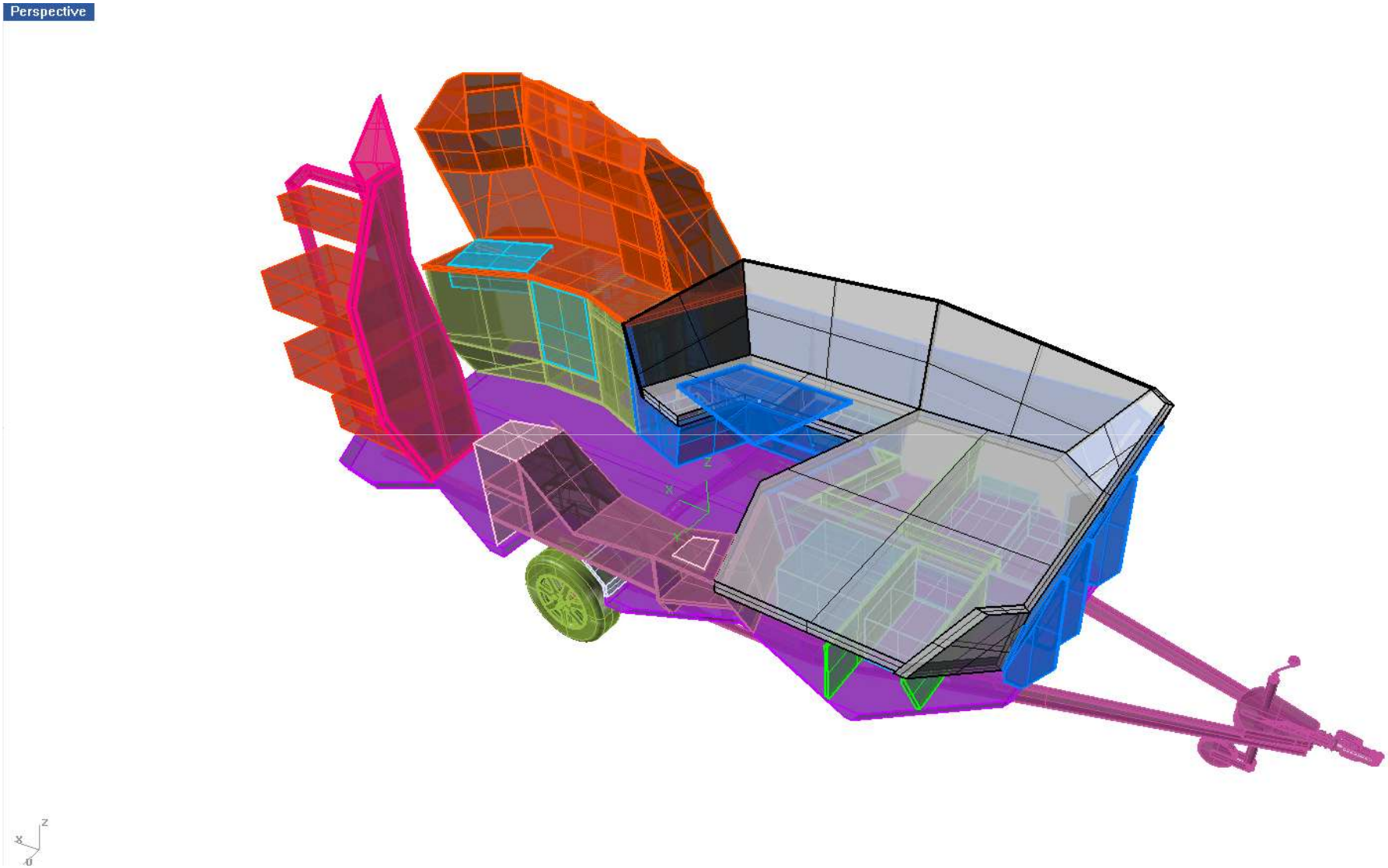
Automatisch generiertes CNC Programm einer Möbelplatte

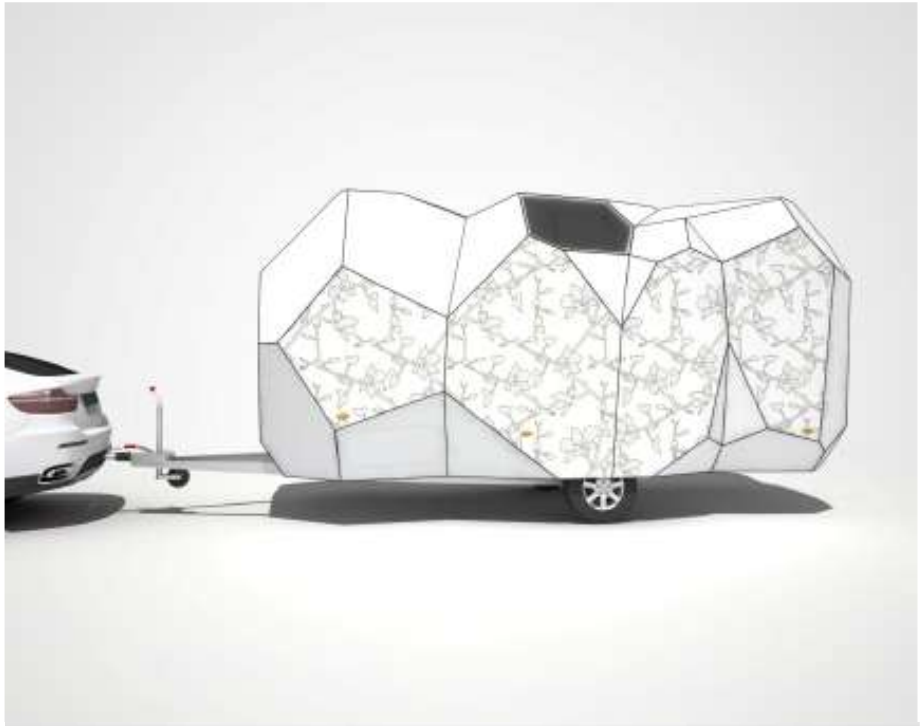
```
H DX=178.41 DY=295.77 DZ=22  A C=0 T=0 R=1 *MM /492358 BX=2 BY=2 BZ=0
MSG "winkel: 90 in richtung: 2 !"
G0R X=26.07 Y=0 Z=31.11 A=0# IC=2 T=101
G1R X=91.49 Y=0
MSG "winkel: 90 in richtung: 2 !"
G0R X=91.49 Y=0 Z=31.11 A=0# IC=2 T=102
G1R X=478.41 Y=0
MSG "winkel: 90 in richtung: 1 !"
G0R X=478.41 Y=0 Z=31.11 A=0# IC=1 T=103
G1R X=347.41 Y=295.77
MSG "winkel: 33.59 in richtung: 2 !"
G0R X=347.41 Y=295.77 Z=31.11 A=0# IC=2 T=104
G1R X=5.71 Y=273.67
MSG "winkel: 75 in richtung: 1 !"
G0R X=5.71 Y=273.67 Z=31.11 A=0# IC=1 T=105
G1R X=26.07 Y=0
```



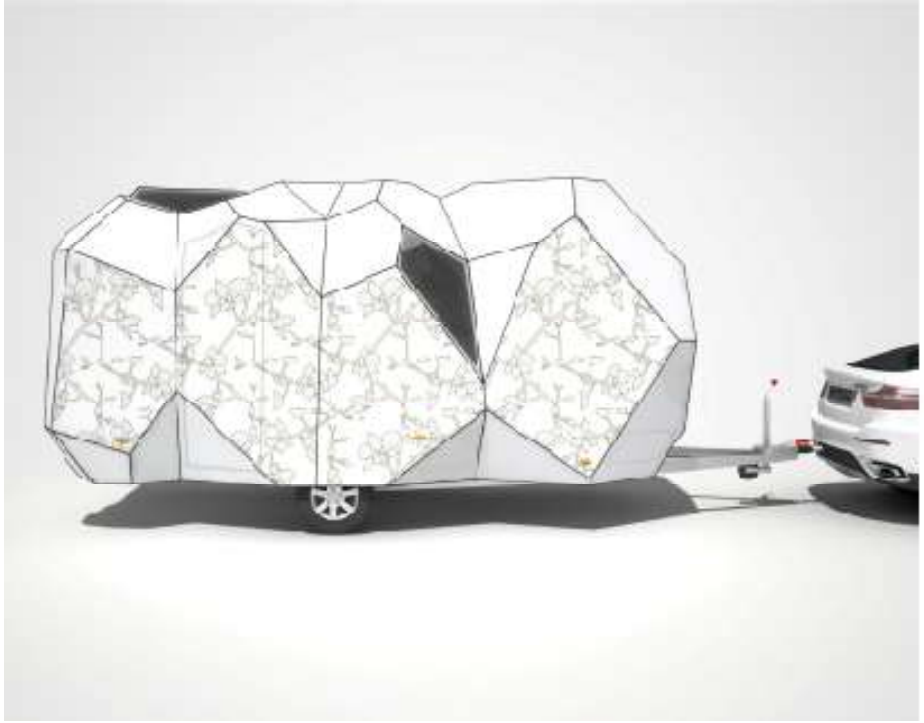

z
y
x


Perspective


Perspective

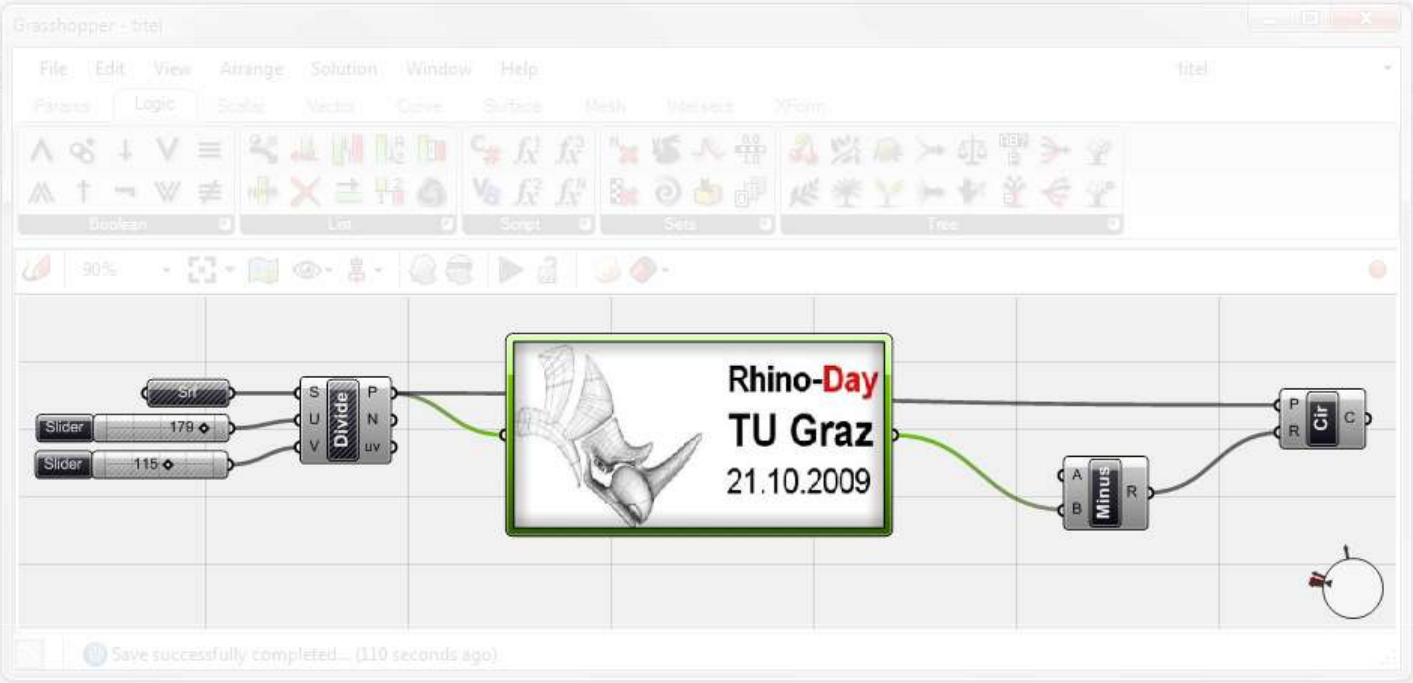


M PU 4563



ALUGAS

mehr-zelter.com


Grasshopper - titel
File Edit View Arrange Solution Window Help
Boolean
List
Script
Sets
Tree
Srf
Slider 179
Slider 115
Divide
Rhino-Day
TU Graz
21.10.2009
Minus
Cir
Save successfully completed... (110 seconds ago)

Rhino-Day
TU Graz
21.10.2009