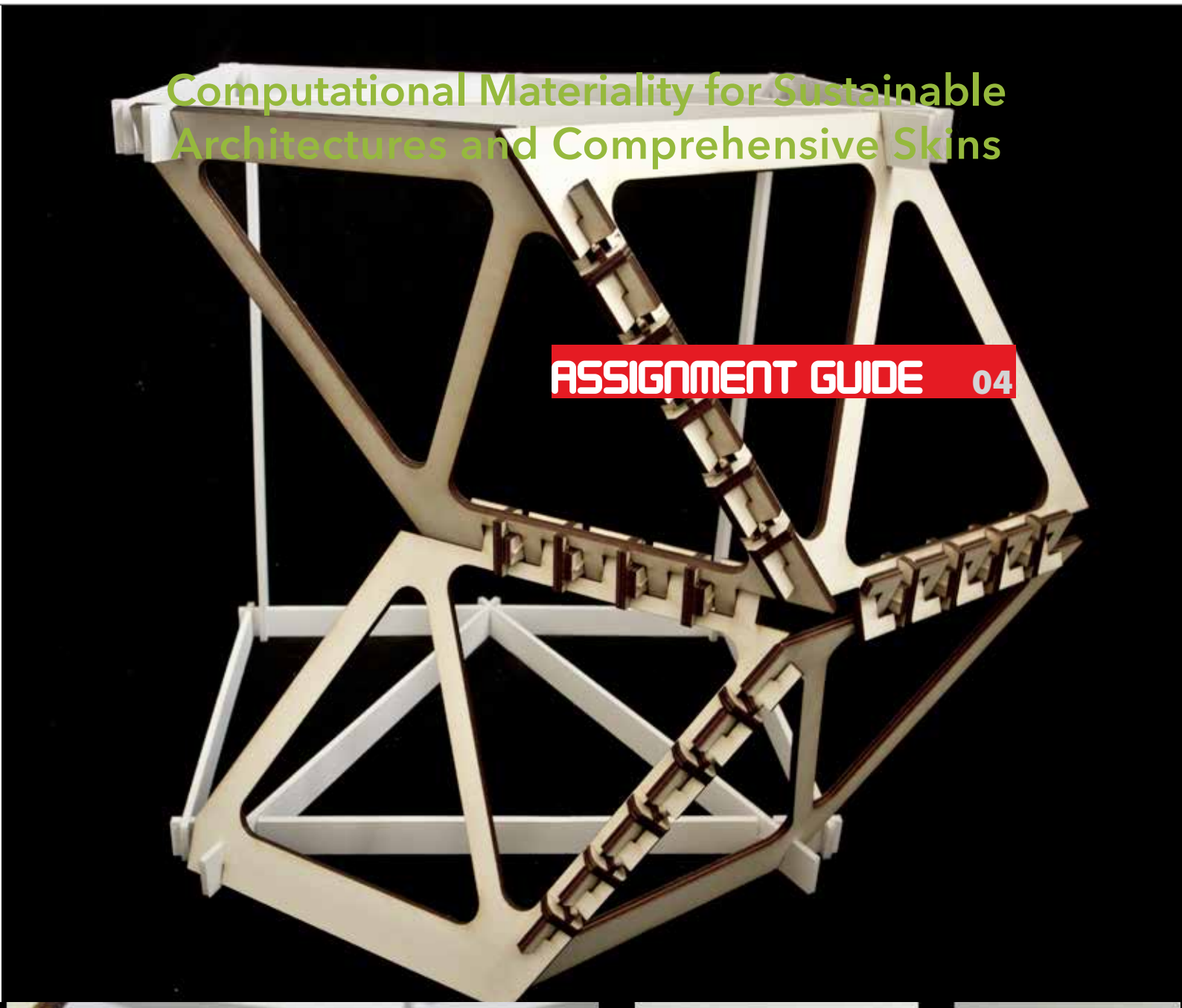
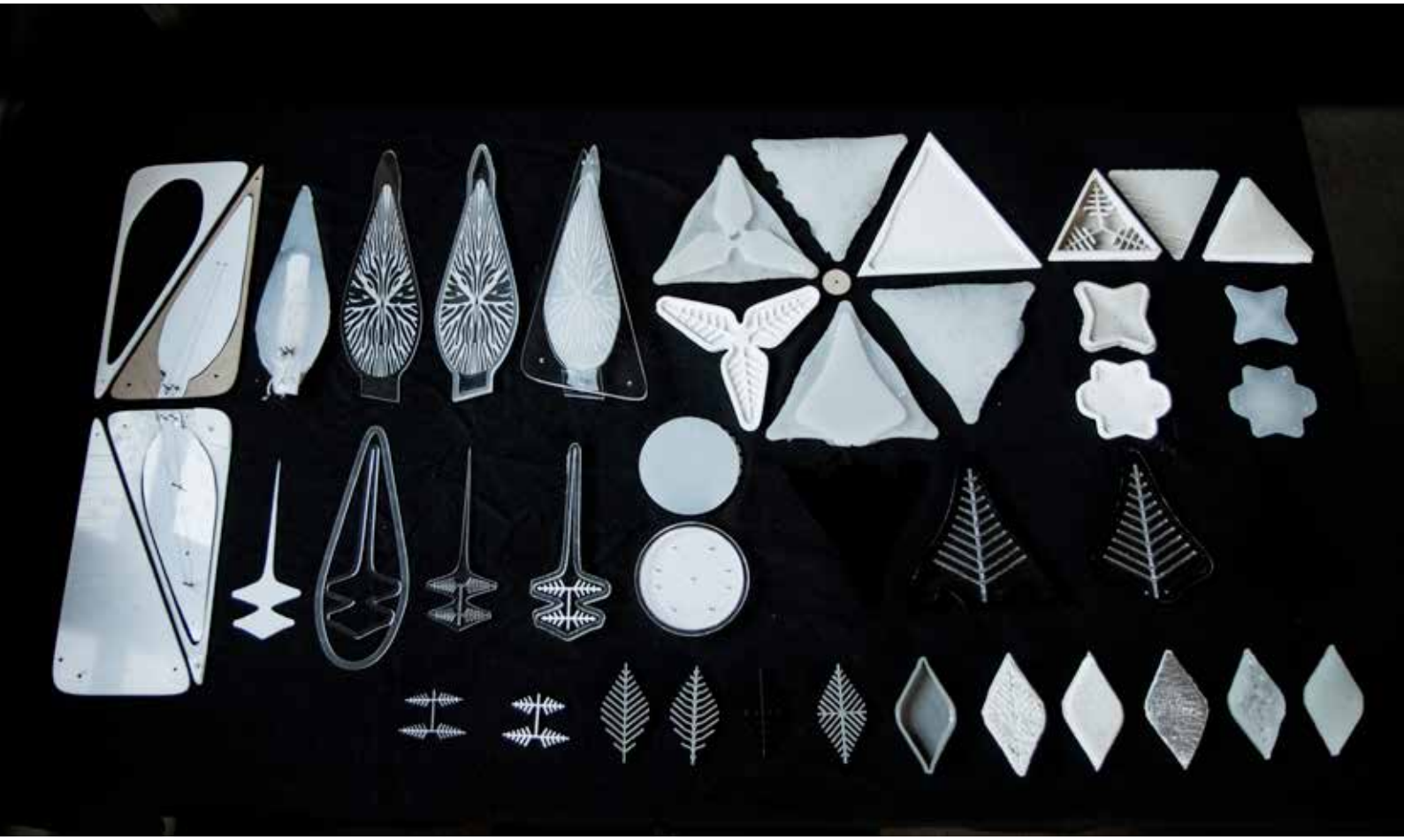
Computational Materiality for Sustainable Architectures and Comprehensive Skins

ASSIGNMENT GUIDE 04



FINAL ASSIGNMENT & Envelope Prototype Manufacturing

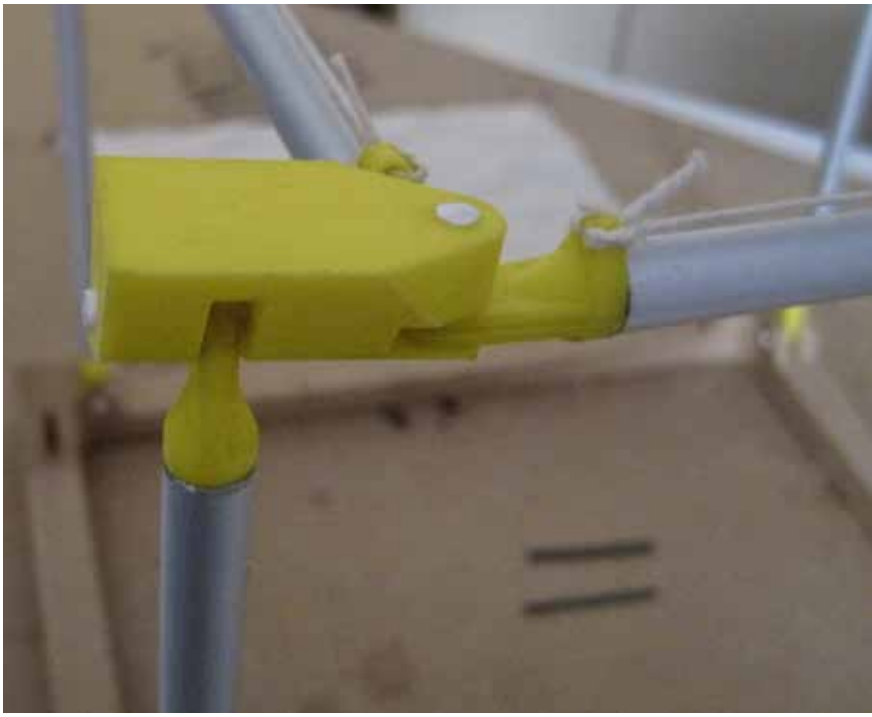
In this exercise students will have to produce a scaled prototype of the envelope system previously studied and they are asked to systematically present the design process carried out during the semester.



What to do

To carry out this exercise, students have to develop an executive study of the chosen envelope system as developed in the previous phases with the aim of producing a model at the most appropriate scale in digital manufacturing.

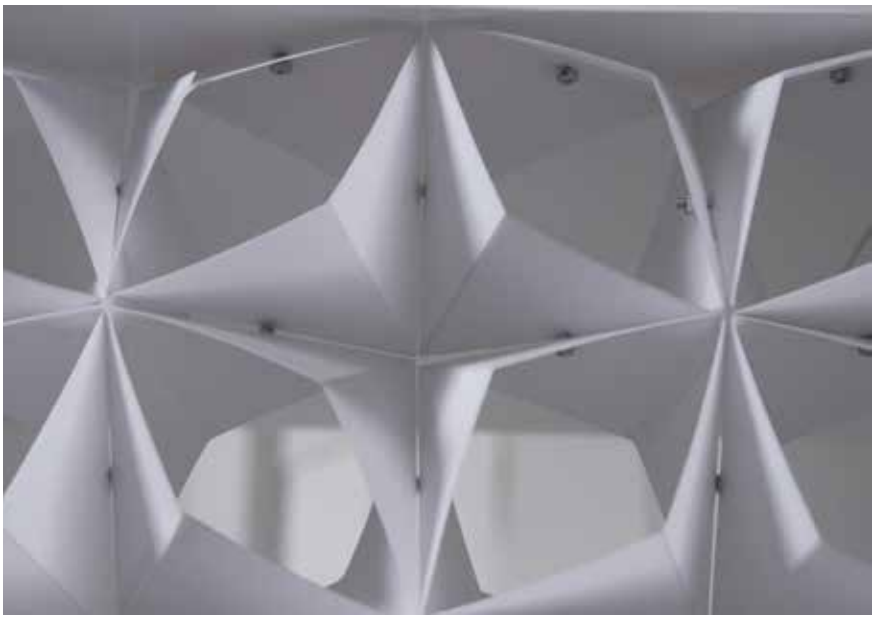
For the final presentation, an album should be produced describing the design process, the reasons for the choices, the detailed technical documentation of the chosen envelope system up to the model's engineering.



How to do

• Envelope Prototype Manufacturing

Starting from the executive project already developed, students will need to develop preliminary studies and rough models in order to prefigure the final design and the assembly procedure of the final model.
Please note that the final model will have to be realized using digital technologies (laser cutting, 3D printing, etc.). For this reason students will need to produce suitable files to inform the production process.
The model scale is free, to be defined in relation to the thickness and size of materials available on the market.
The use of adhesives for the assembly of the various components is very limited therefore the main purpose of the model implementation will be to study junction systems as illustrated in the previous lessons.
If dynamic and/or adaptive systems are to be implemented, the necessary technical and material support will be provided during class activity.



In addition to the completion of the final model, students will have to document through photos, sketches, drawings, renderings, video animations the making process and all the experiments conducted up to the final production.
This process will have to be documented through the creation of a brief explanatory video. In this video, a section must be reserved for the assembly phase that can be described in a virtual way (ie through CAD animations) and/or through the material mounting of the model. For this latter mode, a suggested technique is "stop motion" that will be explained during class activities.

Finally, the video should include images or animations from which it is possible to obtain information on the energy and light effects induced by the proposed enclosure system in the building and in the interior spaces.

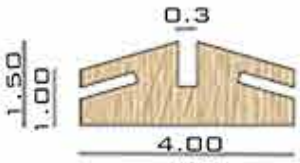
• Final Album

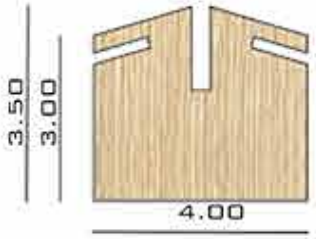
In this document students are asked to illustrate the entire design process as a systematic synthesis of the previous assignments. It should include the following sheets:

JOINT_1

TIPOLOGY A

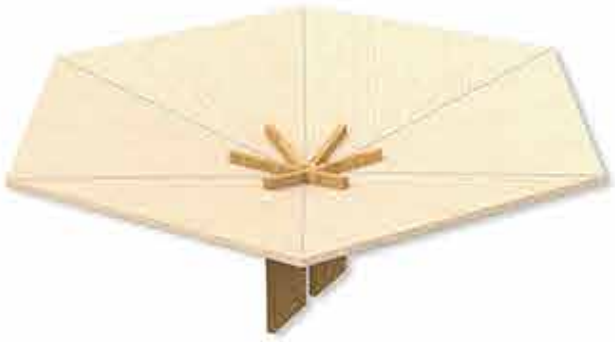
INCLINATION: 14,5°

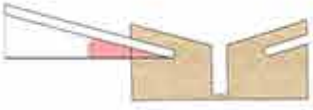




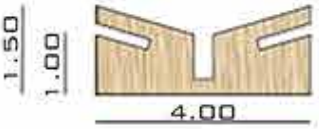
JOINT_2

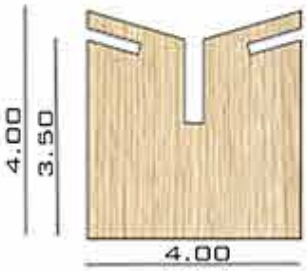
TIPOLOGY B





INCLINATION: 14,5°





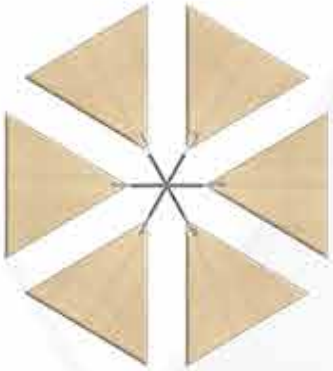
ASSEMBLY

COVERAGE

FINAL JOIUNT

JOINT_3

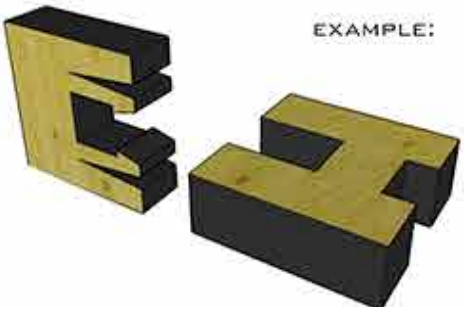
JOINT 3D PRINTED:
IT HOLDS TOGETHER THE PLATES
WITH DIFFERENT INCLINATION

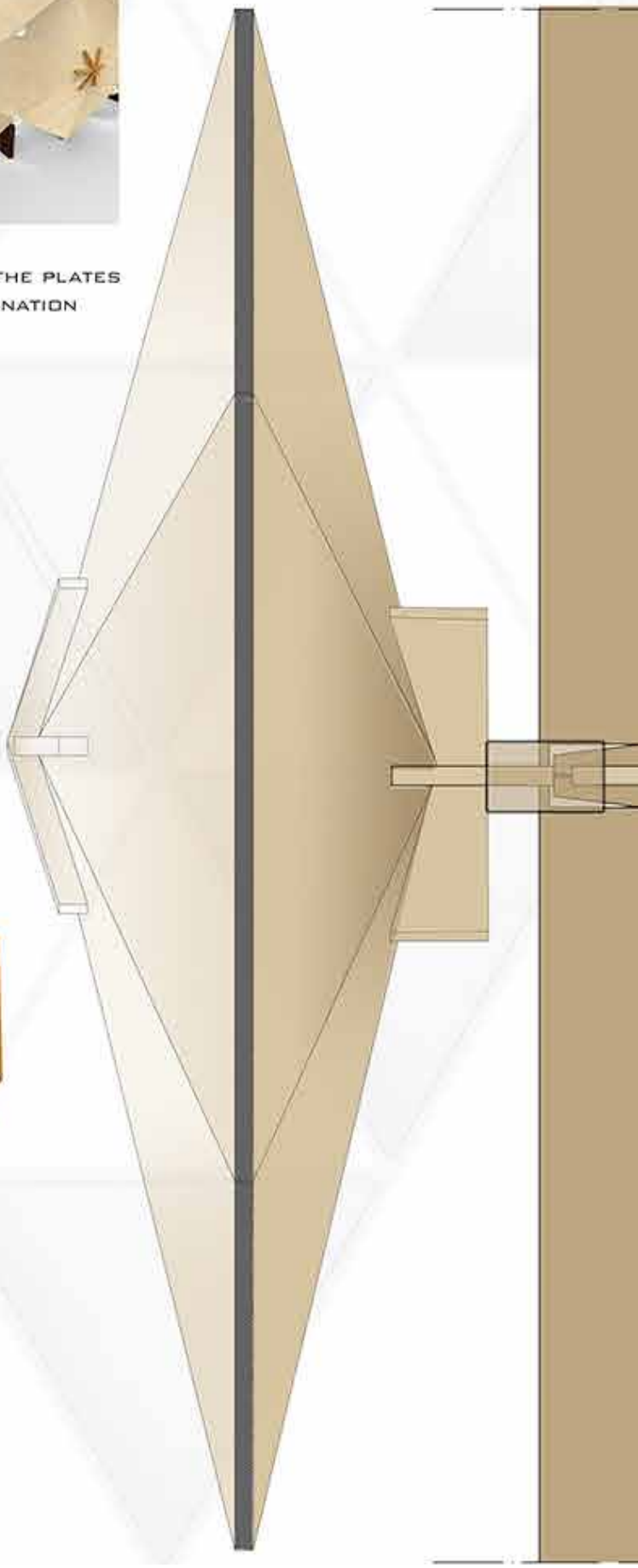


JOINT_4

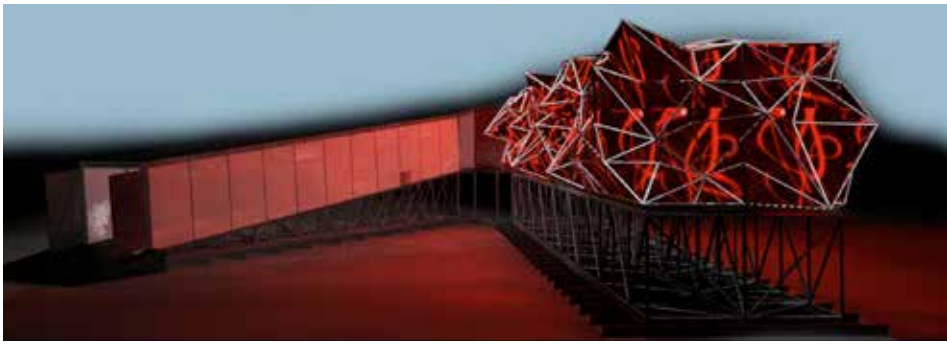
NODE CONNECTION STRUCTURE

EXAMPLE:





1) site & place analysis
2) space program and lay-out organization
3) conceptual mass definition showing the optioneering process of decision making with environmental motivations as a sinthesys of the "Environmental Control Techniques" module activity
4) different envelope solutions adopted for each part of the building complex showing energy, architectural and functional requirements and how the proposed solutions fit them.
5) conceptual design of a selected portion of the envelope system including the comparison of evaluable alternatives through appropriate energy modeling.
6) detailed design of the selected portion of the envelope system
7) high quality render of the building describing the portion of the envelope system and how it is integrated inside the architectural context
8) conceptual design definition and prototyping process documentation of the final model
9) fotos of the final model.



Images from Giuseppe Ridolfi's students' works

Outcomes & Evaluation

Students are asked to submit the following final products:

- the FInal Album in UNI A1 format (horizontal pagination) articulated as described above.
- the Prototype scaled model
- the Video to be produced as explained above. Optionally the video can be introduced by a preliminary description of the architectural building but, in any case , it will have to be closely focused on the envelope system and the model making process. The required video format is 1080p (1920x1080 - 72 dpi)

Evaluations will take place during the final exam.