



THE UNIVERSITY OF

MELBOURNE

MELBOURNE SCHOOL OF DESIGN

FACULTY OF ARCHITECTURE, BUILDING AND PLANNING

Digital Design Application

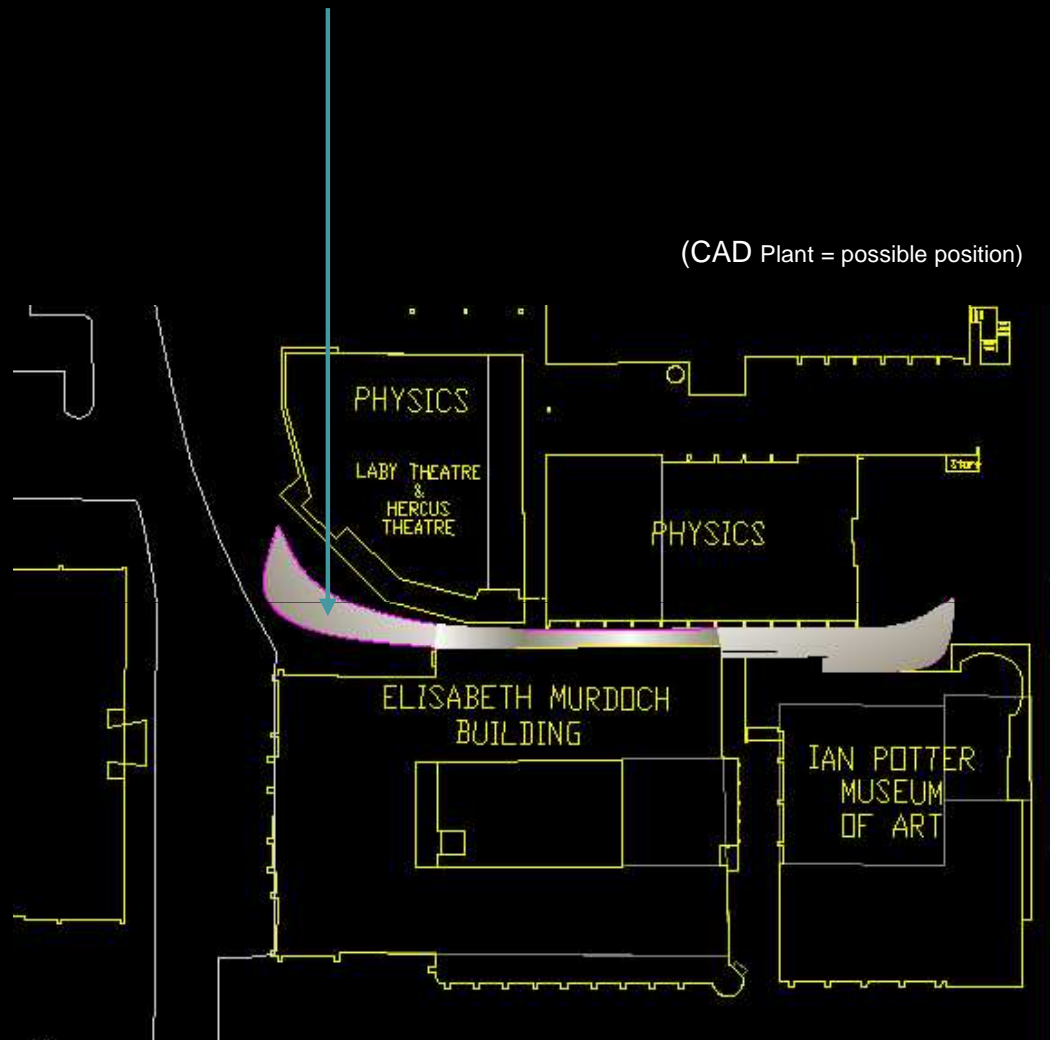
CRIDA: Critical Research in Digital Architecture.

Fabrication proposal:

**ENVELOPE FOR A SPATIAL CORRIDOR
Castro's Café to Brunetti's _UNIMELB**

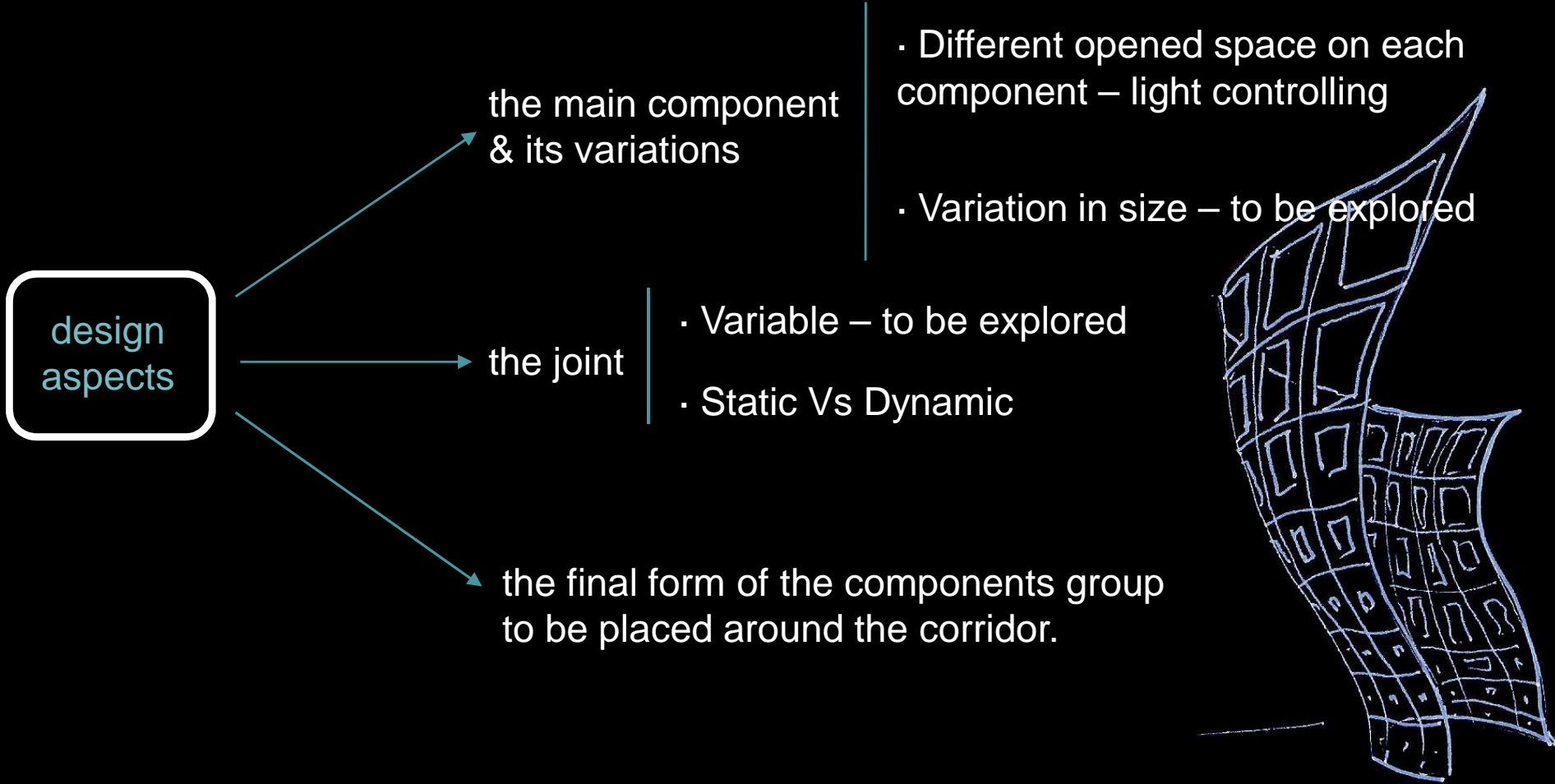
project

Creating a structure for the “Spatial Corridor” able to control the solar light and the wind and to provide the support for artificial light at night.



concept

Using a tessellation to create a continue double curve _ Controlling the variations
Fabricating an **efficient** system _ Creating an **unique** element _ testing by making

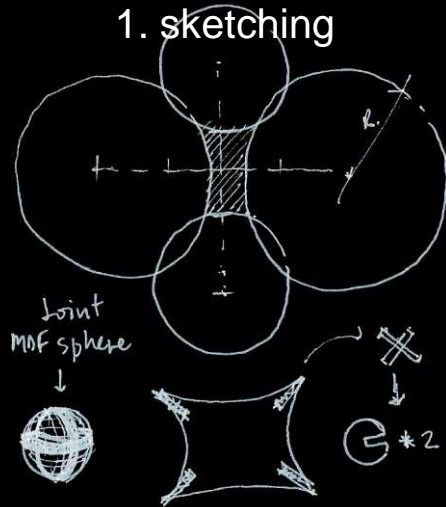


testing by making _critical approach

Model_01

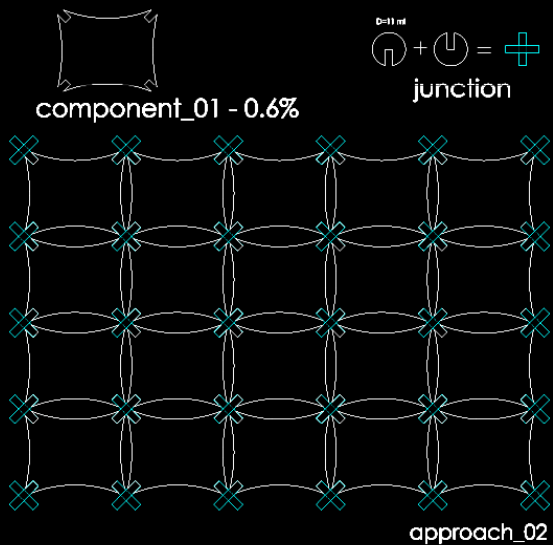
design approach

1. sketching

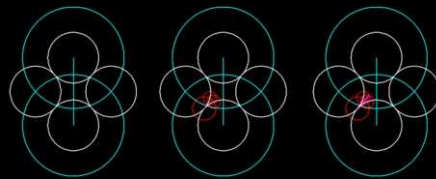


2. CAD representation

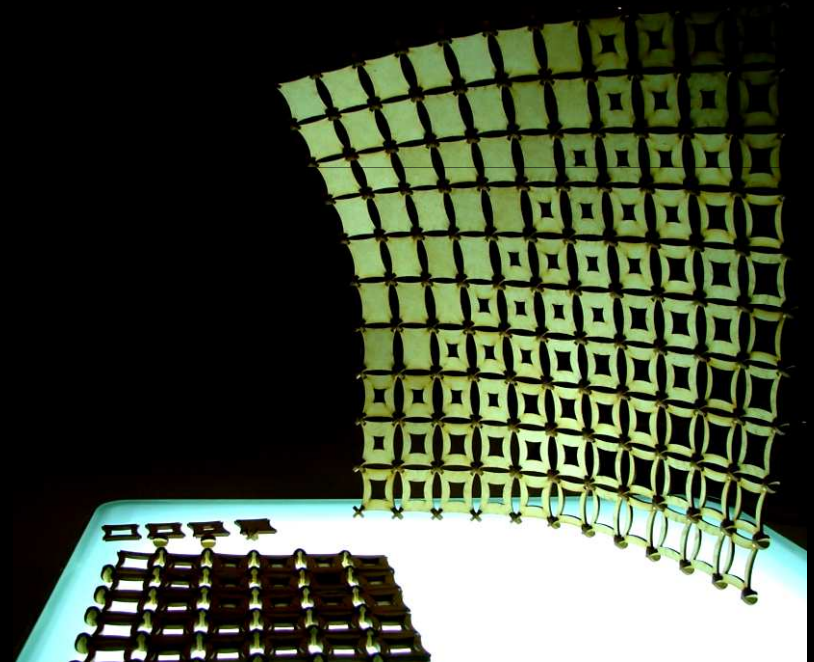
3. Laser cutter & Fabrication



creating the component



component variations



Model_01 → Conventional exploration process



aspects

- same size of the component = low cost – easy fabrication
- same type of joint = low cost – easy fabrication
- no extra materials (glue) = low cost – easy fabrication
- 4 different components = tessellation – variable shadow
- no extra time on digital design



aspects

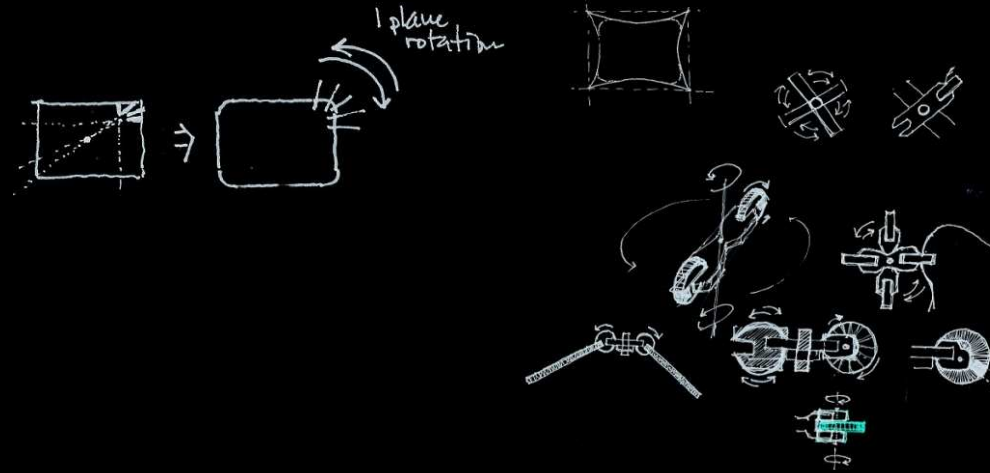
- static result = no easy exploring variations
- using material tolerance = depending on the material
- base on a small number of components = inefficient to export to a large model
- decrease the possibilities of documentation = no digital 3D
- based on forcing the material = risky real application

testing by making _critical approach

Model_02

design approach

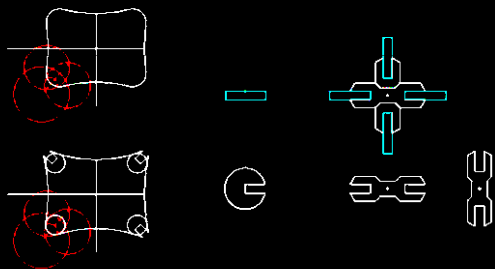
1. sketching



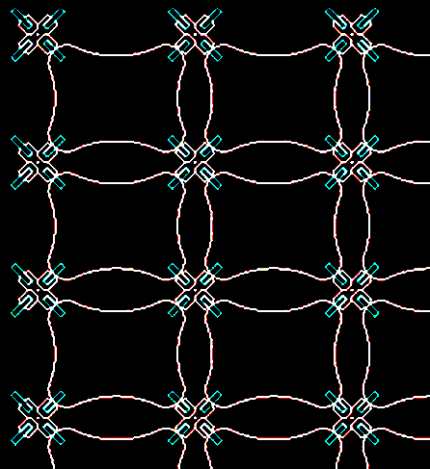
2. CAD representation

creating the component

joint



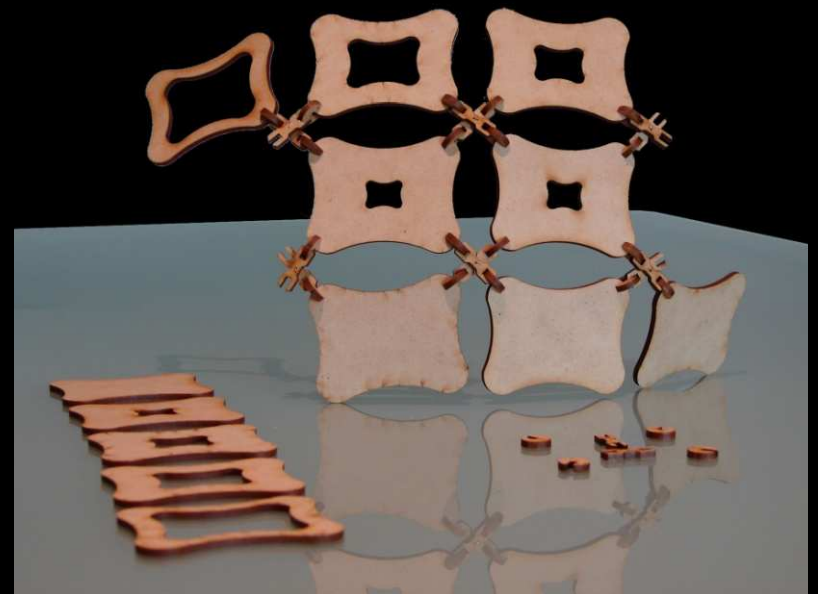
group of components



component variations



3. Laser cutter & Fabrication



Model_02

→ Conventional exploration process : imitating a computer



aspects

- rotating joint = to explore multiple shapes and variations
- customize joint = each joint will be different
- same size of the component = low cost – easy fabrication
- same components of the joint = repetitive mech. system
- no extra materials (glue) = low cost – easy fabrication
- 4 different components = tessellation – variable shadow
- no extra time on digital design



aspects

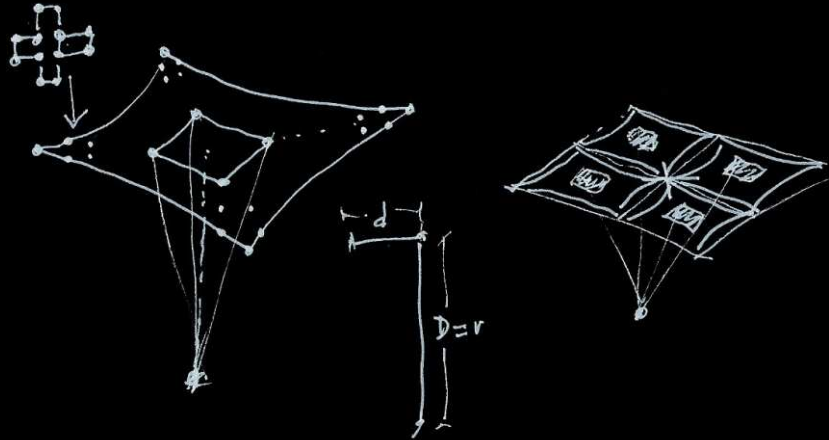
- dynamic model = no real applications_ static Architecture
- customization process = inefficient to be studied for each joint separately.
- too complicated system = mechanical approach
- using material tolerance = depending on the material
- base on a small number of components = inefficient
- decrease the possibilities of documentation = no digital 3D

testing by making _ critical approach

Model_03

design approach

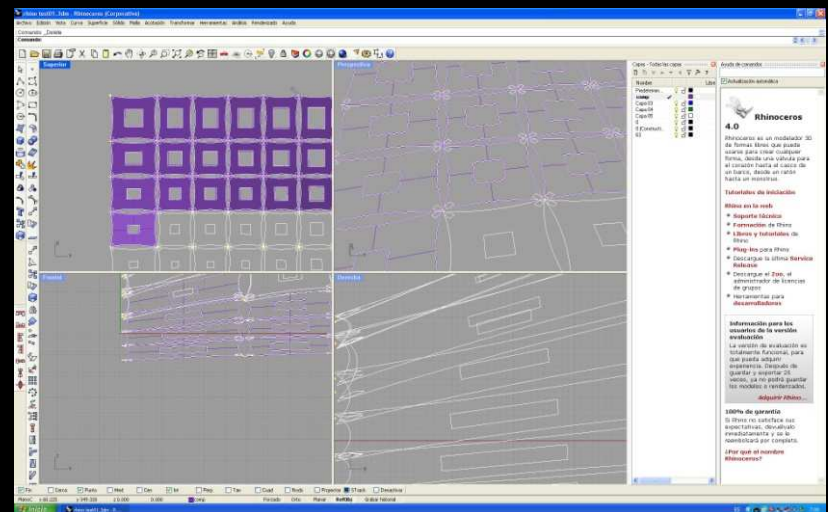
1. Sketching to make efficient the previous design



2. Modeling by using Generative Component



3. Exporting to rhino to unfolding



4. Laser cutter & Fabrication _ next stage to be completed

testing by making _critical approach

Model_03 → GC model_process: 1. CREATING A REACTIVE COMPONENT

The screenshot displays the MicroStation software interface for a GenerativeComponents (GC) model. On the left, a transaction list shows a series of 77 operations, including adding and changing points, arcs, planes, lines, and polygons. The main workspace is divided into two views: 'View 1 - Symbolic - Top' and 'View 2 - Default'. 'View 1' shows a complex wireframe structure of the model. 'View 2' shows a 2D projection of a component with a central circular opening. Two pink arrows point to the opening and a control point, labeled 'Variable opening' and 'Point to control the opening' respectively.

testing by making _critical approach

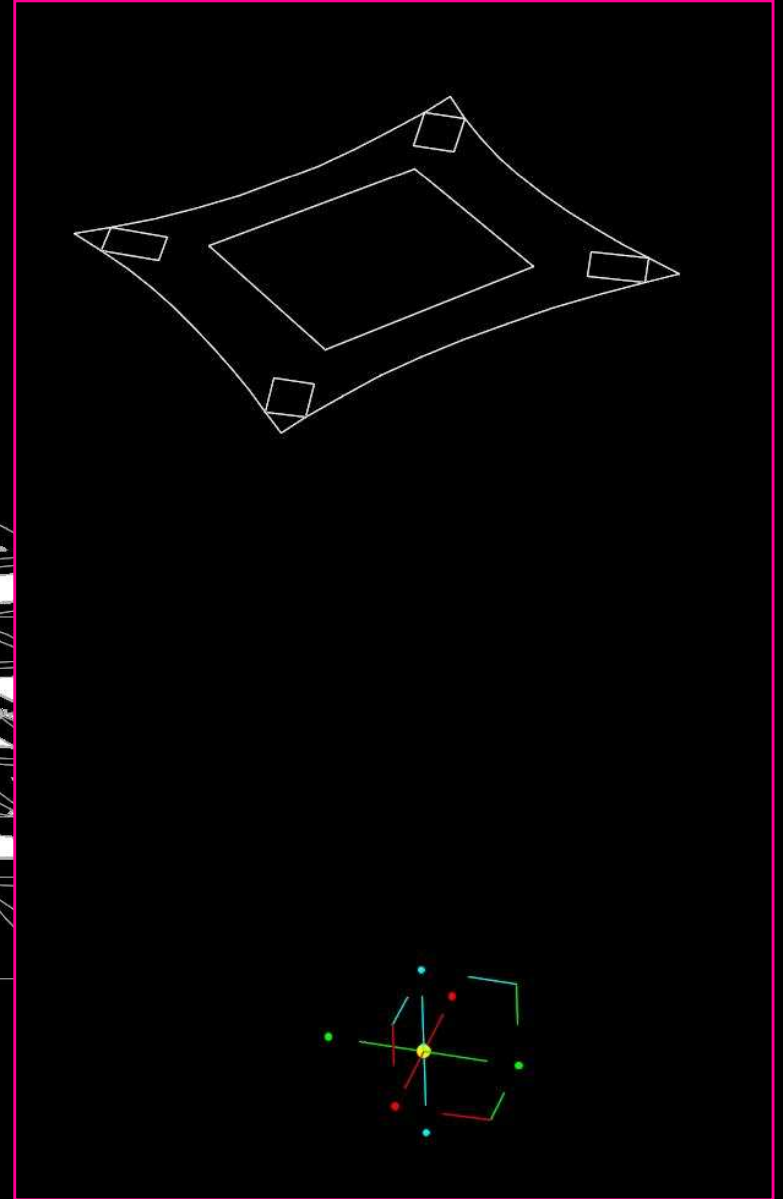
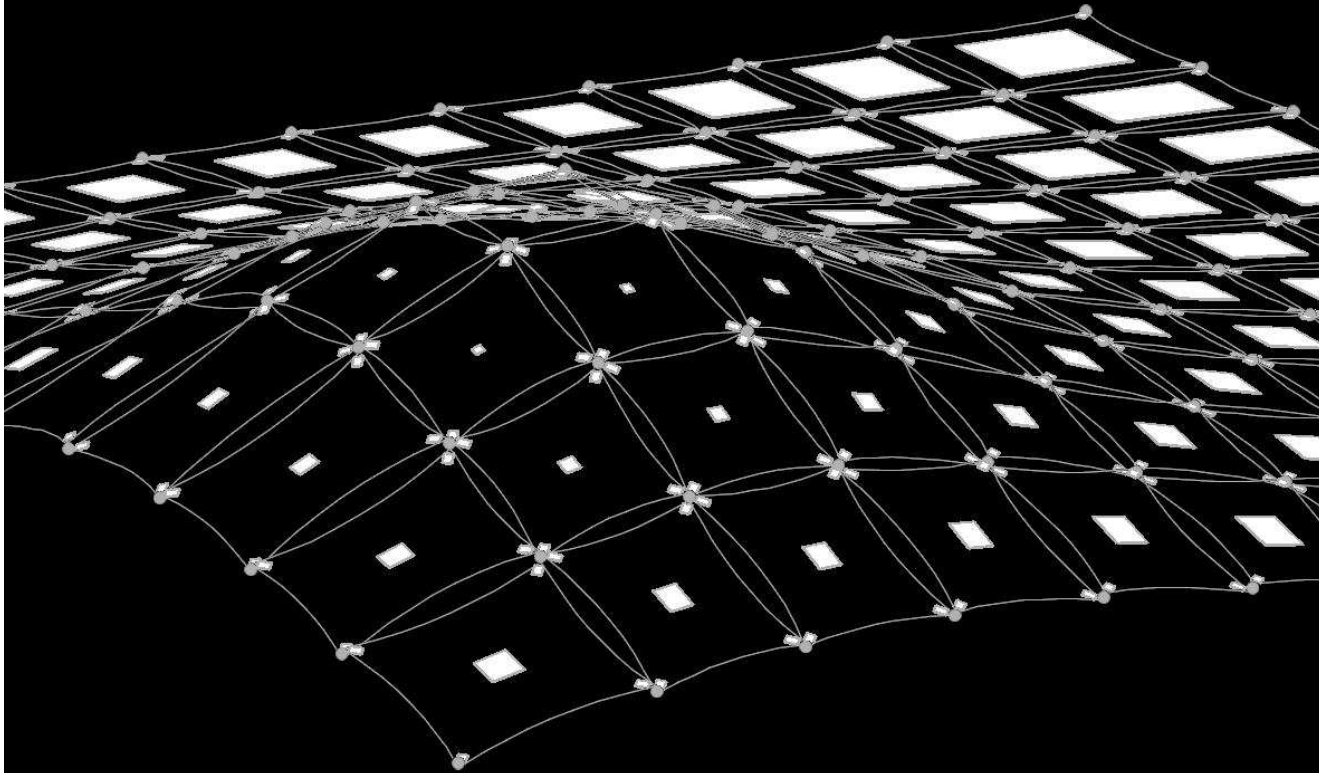
Model_03 → GC model_process: 2. APPLICATION ON A VARIABLE SURFACE

The screenshot displays the MicroStation GenerativeComponents (GC) interface. On the left, the 'Properties' panel for a feature named 'Z_comp_20' is visible, showing a table of properties and expressions. Below this, a small graph shows the hierarchical structure of the components. The main workspace is divided into two views: 'View 1 - Symbolic - Top' and 'View 2 - Default'. The 'Default' view shows a 3D perspective of a variable surface, which is a grid of yellow nodes connected by lines, forming a mesh of squares. A pink arrow points to this surface with the label 'Variable surface'. Another pink arrow points to a specific node on the surface with the label 'component variations: size and opening'. The bottom of the window shows the Windows taskbar with several open applications.

Property	Expression
point29: IPoint (repl.)	point05
polygon01: Polygon (repl.)	polygon01
bsplineCurve02:...	{{z_comp_2001[0]...
bsplineCurve03:...	{{z_comp_2001[0]...
bsplineCurve04:...	{{z_comp_2001[0]...
bsplineCurve05:...	{{z_comp_2001[0]...
polygon03: Polygon	{{z_comp_2001[0]...
polygon05: Polygon	{{z_comp_2001[0]...
polygon06: Polygon	{{z_comp_2001[0]...
polygon07: Polygon	{{z_comp_2001[0]...
polygon08: Polygon	{{z_comp_2001[0]...
Success: bool	true

testing by making _critical approach

Model_03 → GC model_process: 3. EXPLORING THE RESULT



Model_03



Digital exploration process : working efficiently



aspects

- variable component = to explore efficiently multiple shapes
- customize joint = each joint will be different
- the material is not forced = real application
- reduced complexity of the system
- customize openings of component = efficient tessellation
- no extra time on variations = easy exploring with GC model
- increase possibilities of documentation = digital 3D



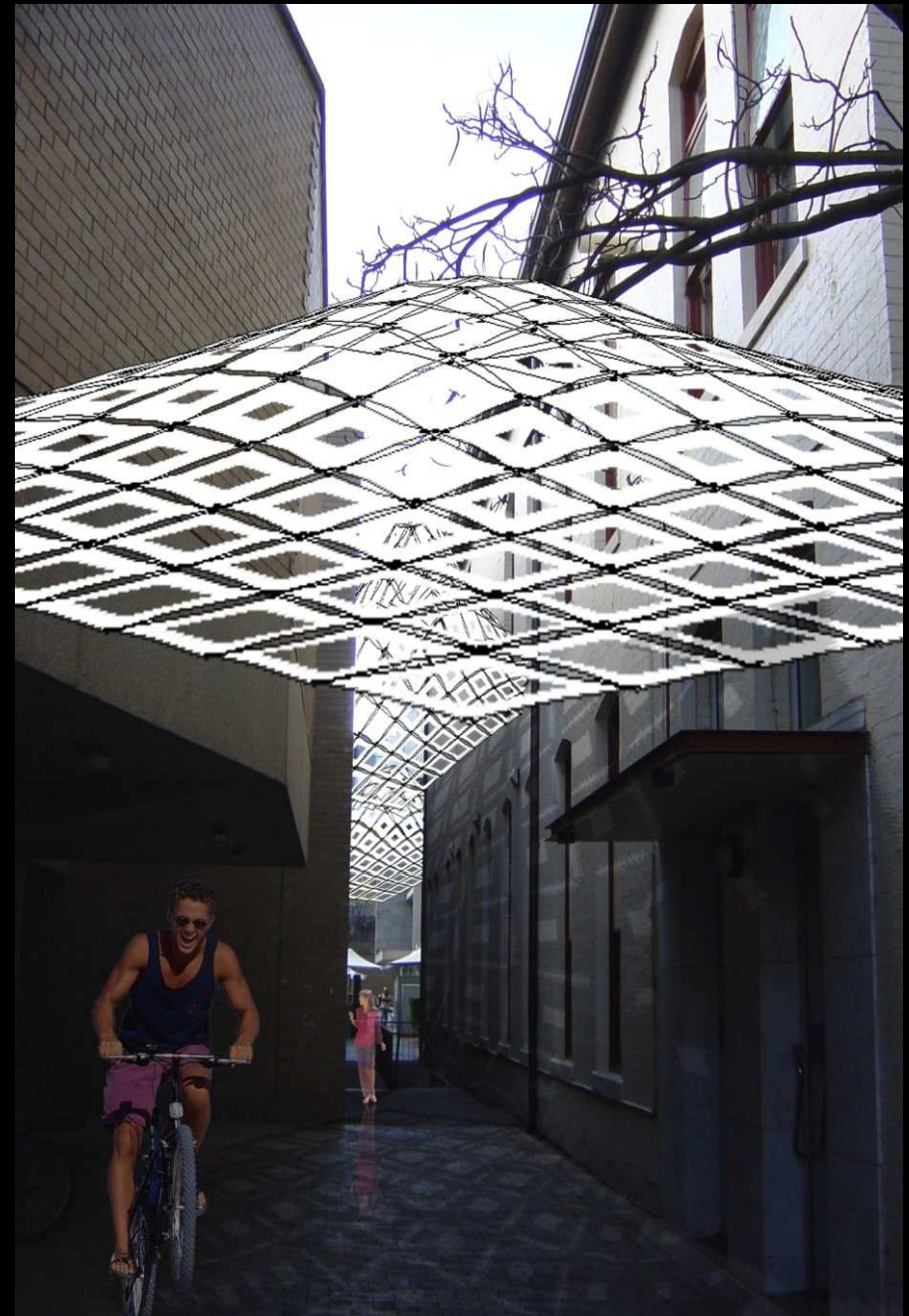
aspects

- necessity of CNC for each component and joint
- extra time on GC digital design
- require the understanding of the software
- possibility of unreal results in terms of fabrication

testing by making _critical approach

Model_03 → Digital Design Application

- the continuous surface changes from **vertical** to **horizontal** position.
- vertical pos. wind & privacy control
- horizontal pos. rain & light control

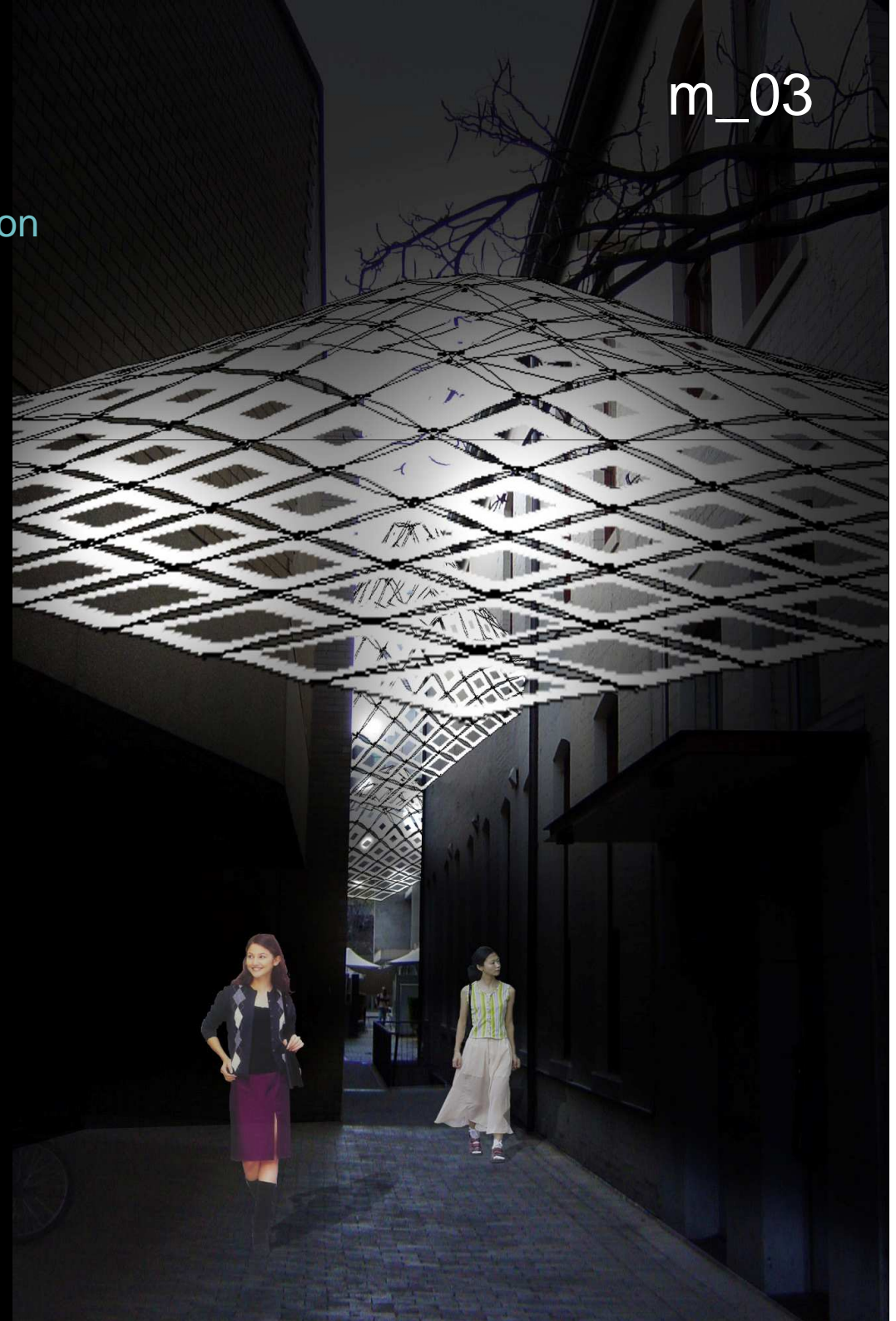


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Model_03 → Digital Design Application

- the continuous surface has the possibility of providing **artificial light** at night time.



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conclusions

Digitally driven design processes can produce unique objects based on an efficient system of creation, fabrication, documentation and testing of variations.

Digital design should: be guided by fabrication logic, consider the properties of materials and face the real approach of the whole project.

Digital design has unlimited possibilities in terms of project scale. The number of components become unlimited providing the tools to control them.

The probability of fabrication mistakes increases because customized components are included. Consequently CNC process and excellent documentation are necessary to avoid inefficiency.

Artist's logic cannot be substituted by a computer program.

Digital design is a new tool used nowadays to create and explore the design, far beyond the representation purposes of the past.

Therefore, nowadays Computers become extensions of our brain, and not only of our hands.



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STUDENT: RAFAEL URQUIZA SANCHEZ