Portfolio

Undergraduate

ZHANG
YIWEI

- Personal CV
- Project1: Knitted Tower
- Project2: Folk Custom Museum Design
- Project3: Mixed Community Estate Design
- Project4: Street Threshold Reform Design
- Other Work



Knitted Tower

A project of a 7.2m high freeform tower designed paramatically and digitally fabricated with fabrics and resin in challenging the height with minimum thickness.

Undergraduate students:
ZHANG YIWEI, HU JIA,
ZHANG AILIN, CHEN QI,
LI BIN,

Doctors:
LIU YIGE, CHAI HUA

Profesor:
PHILIP F. YUAN

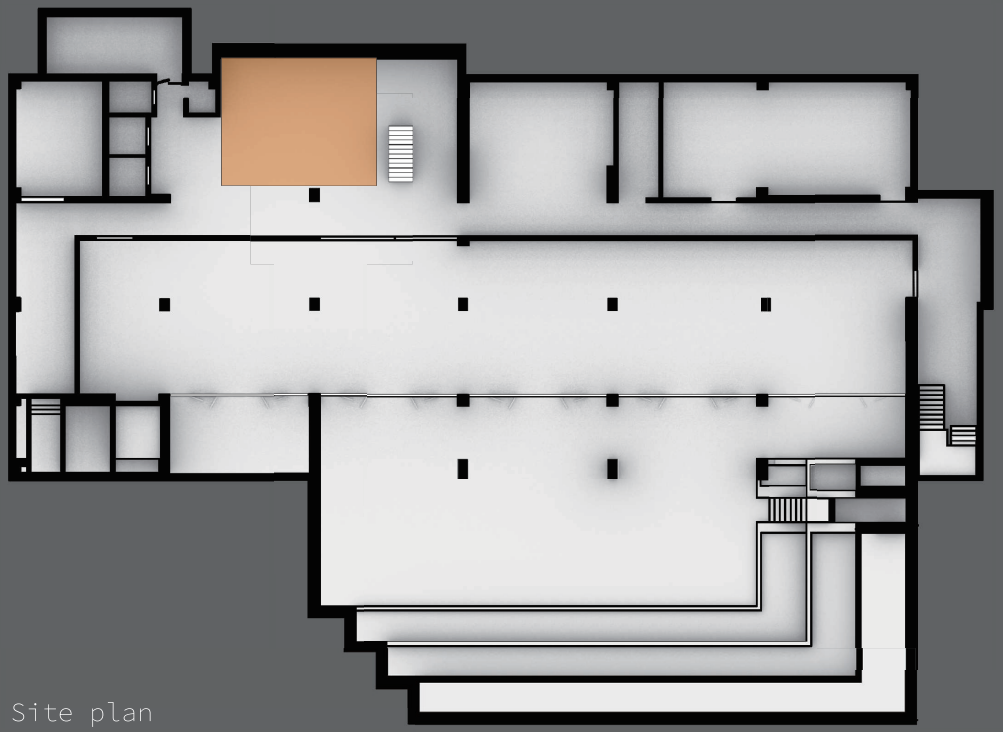
From May to July, 2019

Tongji University

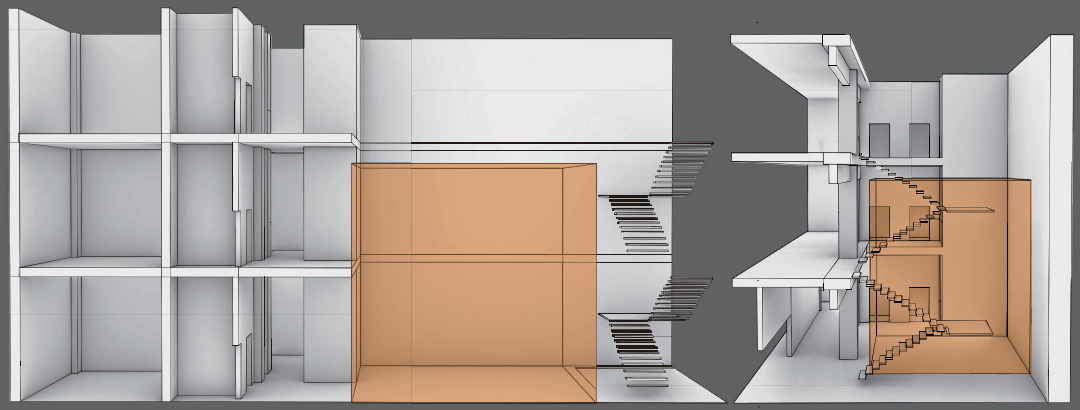
Site

Befor making a 3D model in to a real installation, there is much work needed to be done. The first step to accomplish this goal is to devide the whole surface into stripes within a certain width which can be handled by kniiting machines.

Images below shows 2 different solutions our group tested specializing for mesh or nurbs 3D model
that makes them into 2D parts.



Site plan



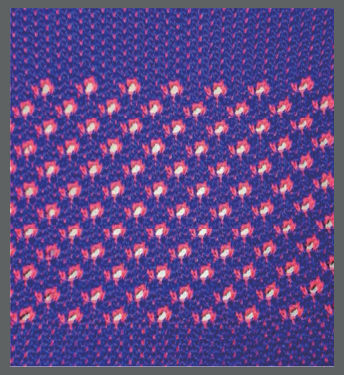
Section A perspective

Section B perspective

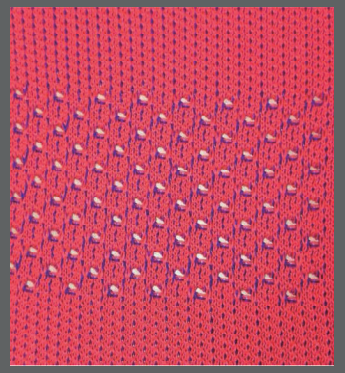
Technology

In order to obtain the expected fabric for the whole tower, the technology of program-controled machine knitting is necessary.

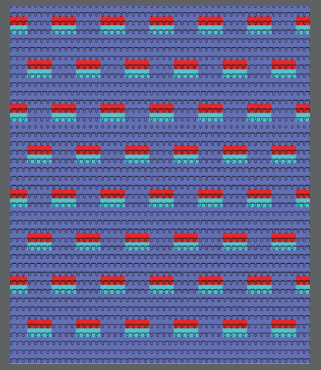
When doing the different part of the tower: attached double layer fabric, seperated double layer fabric, holes on the fabric and fabric boundary etc., every knot on the fabric is precisely defined by the program.



Fabric front



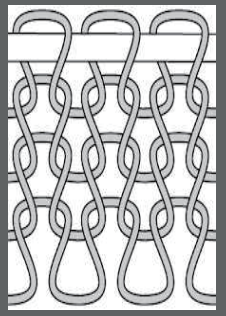
Fabric back



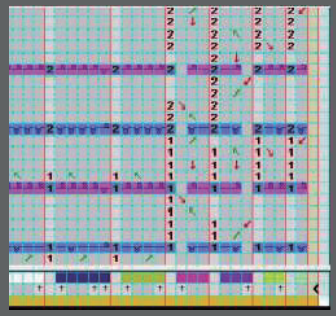
Knot type



Knitting machine



Knots



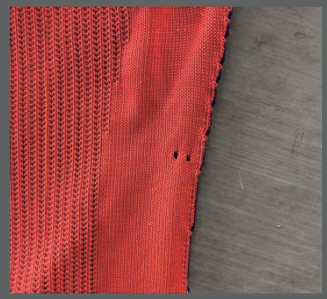
Knitting chart program



Hole pattern



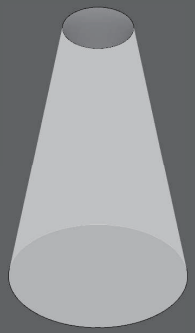
Plane pattern



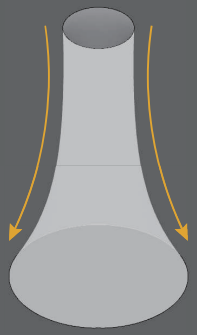
Pipe & hole pattern

Shape

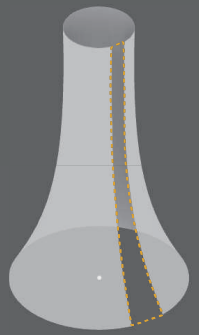
Our given task is to challenge the height of the tower with least possible thickness of the shell and the aesthetic quality of the shape should also be taken into consideration.
Pictures below show the whole process when we are discussing on the apearance of the tower.



Tower prototype



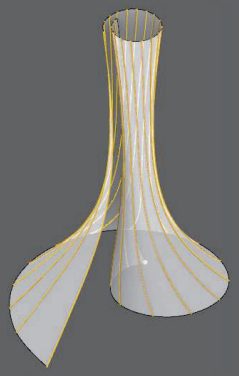
Overall contracture



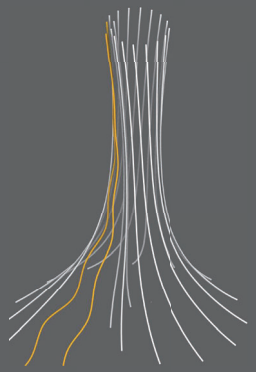
Opened interior



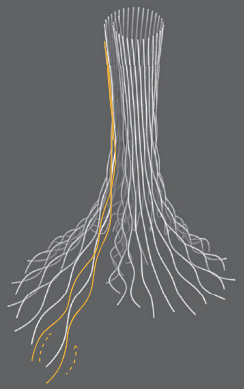
Curled exterior



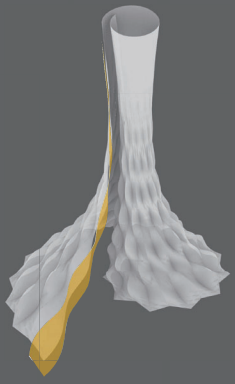
Structural line



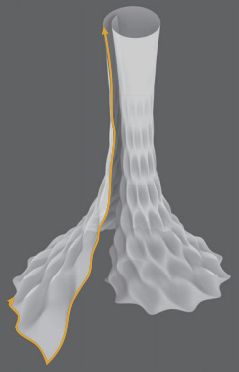
Heaved structural line



Two-way structural line



Line controlled surface



Smooth surface



Controled boundary

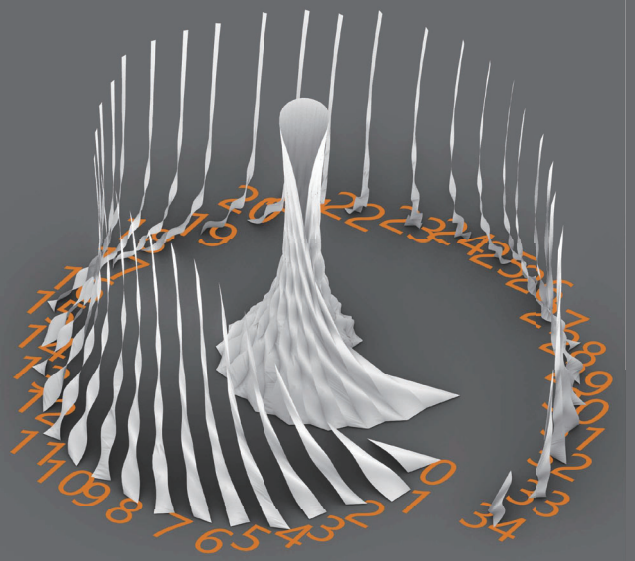


Surface substraction



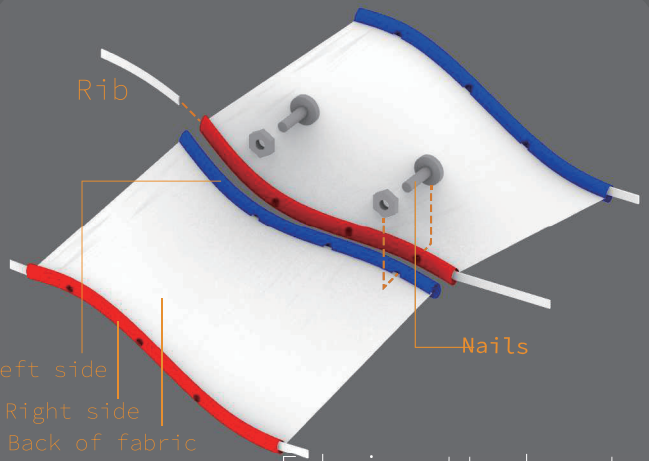
Final shape

Tower & Controlling system



Surface division

Because of the high precision of the surface and the width of knitting machine, we finally devided the surface into 35 pieces to well control the tower when it is being constructed.



Fabric attachment

It is not a easy work to combine one piece to another under the tension of a 7-meter-long fabric, we try to use iron sheet ribs and nails every 12cm to continously control the whole fabric and disperse the tension equally.

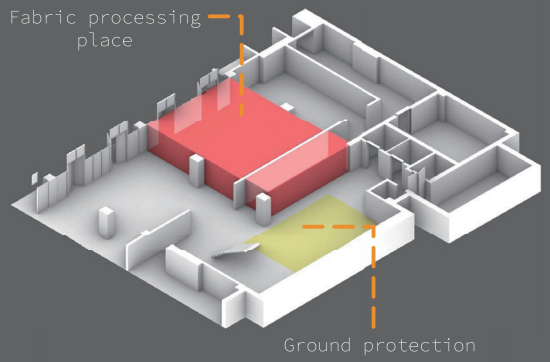
These laser cut iron sheet ribs play the most imortant role in controlling the whole surface.

The tightening rope functions as a backup for other control system and only does mild adjustment to the surface after everything during the construction process is done.

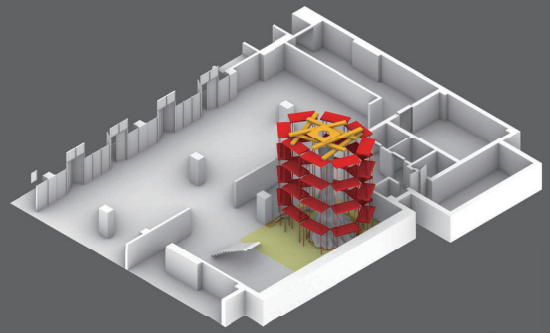
The wooden plates on both the bottom and the top of the tower aims to hold all the iron ribs at their positions and provide attachment to the outer scaffold.

Construction simulation & photos

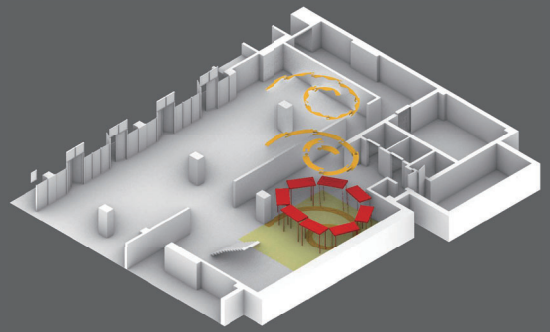
Before we start a real construction, a process of simulated construction is designed to make sure the actual sizes of each step, number of scaffold and the leaniong board we need for applying resin to the whole surface.
Also, the overall feasibility of our workflow is examined carefully in order to make sure of everthing can be finished within limited time expectancy.



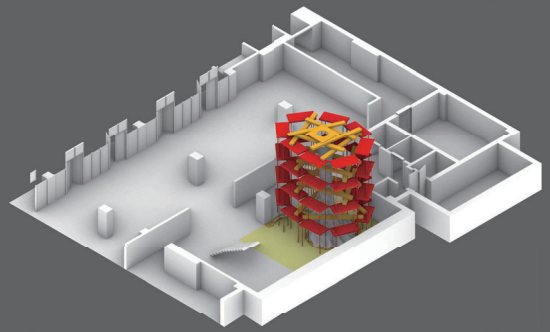
Woking place



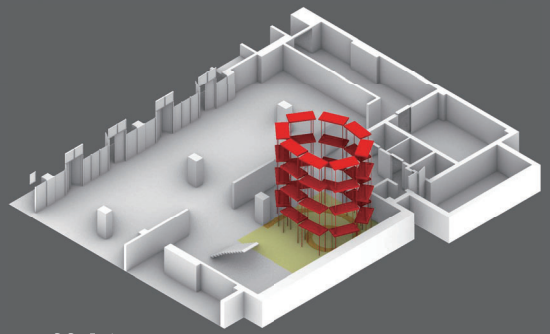
Fabric suspension and attachment



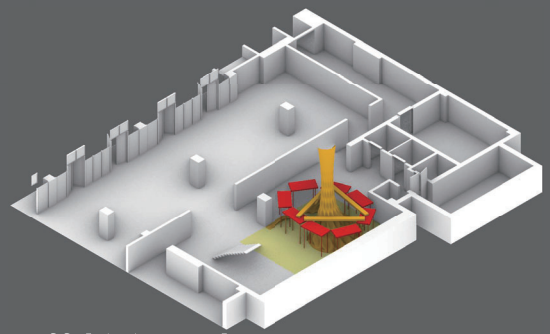
Foundation and scaffold positioning



Leanning board and resin application



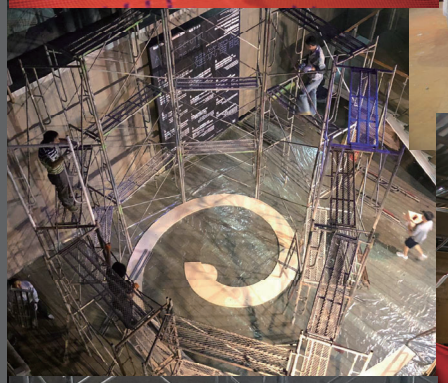
Scaffold construction



Scaffold dismantlement





















Folk Custom Museum Design

Individual Work

Student: ZHANG YIWEI

Teacher: JIANG HAO

From September to November, 2017

Tongji University

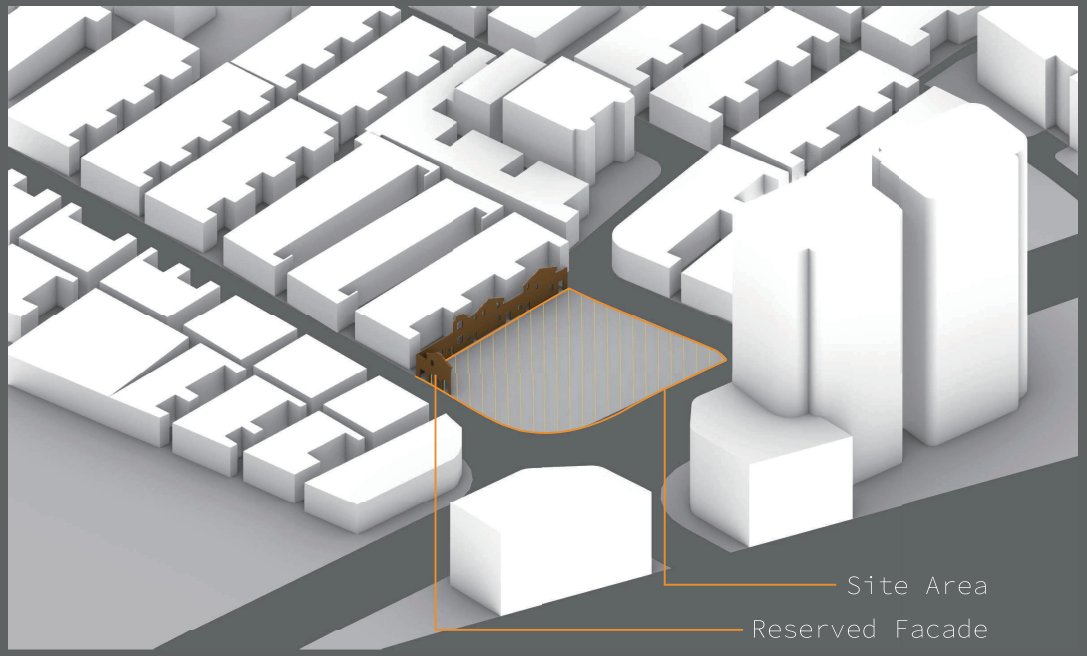


Site

This site is located at the street corner of a mixed community consisting of historic residential and modern commerce and the design work aimed at providing a museum for exhibits which refelcted the local customs including photos, articrafts and private collections. Besides, there was a reserved wall showing local residential with its facade so this work had to be a negotiation between present condition and personal creative thoughts.







Environment

Once this area was a full-functioned community of Shanghai. However because of its central location in downtown Shanghai, the whole area had been gnawed off by modern commerce. With the two blocks being pushed over, the historic character of the area had been much more vulnerable. I was trying to make the site a beginning with which cushion area could be made so that both the modern and the history could coexist on their own.

Modern commerce
Traditional residential
Hospital
Office building
Pulled over area
Site
Metro station
Present Movement Flow
Designed Movement Flow

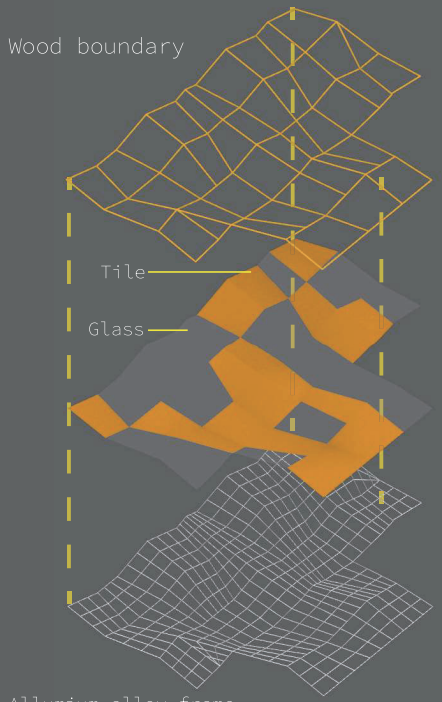


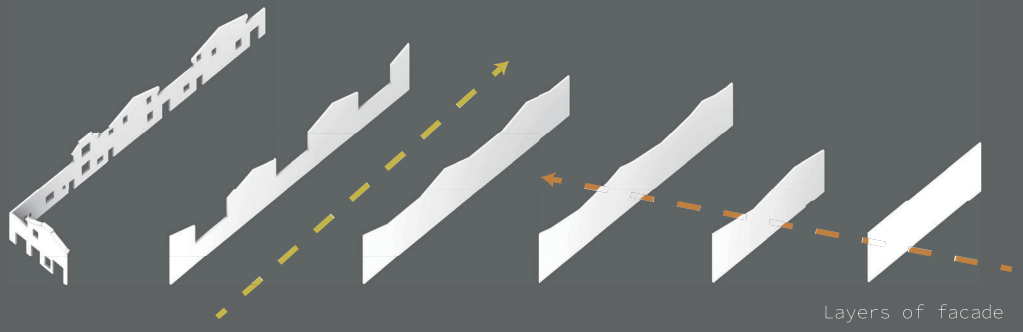
Feature: Texture extension

In order to get along with local image, 3 features were added to the origin thought of design:
1. Linear spaces were set at the width of 6.3m, nearly half the width of the buildings in nearby communities.
2.Difference of transparency between horizontal and vertical directions to enhance both movement flow and keep visual experience alike with the area.
3.The flucuating roof provided not only seemed modern but also could be treated as continued roof top from the surrounding. Additionally, the tile and glass on the roof made the space underneath more interesting.



Space sacle

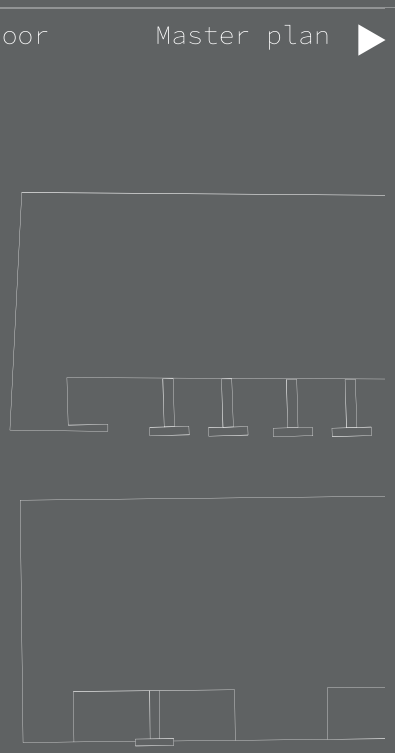


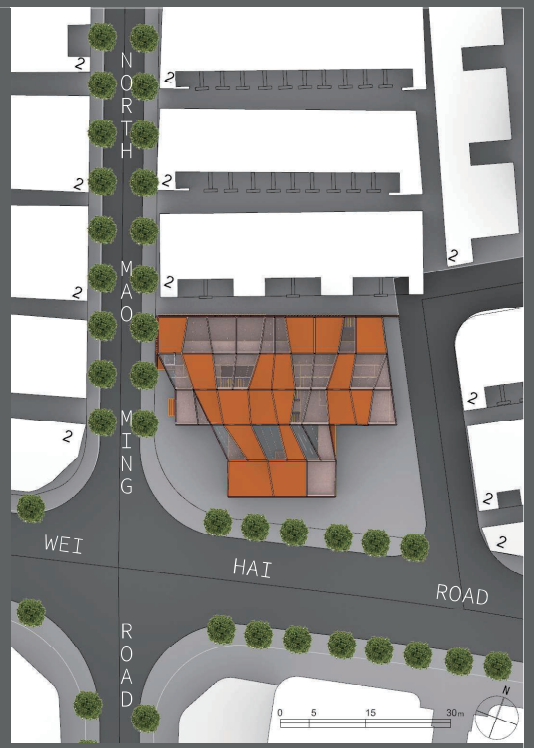


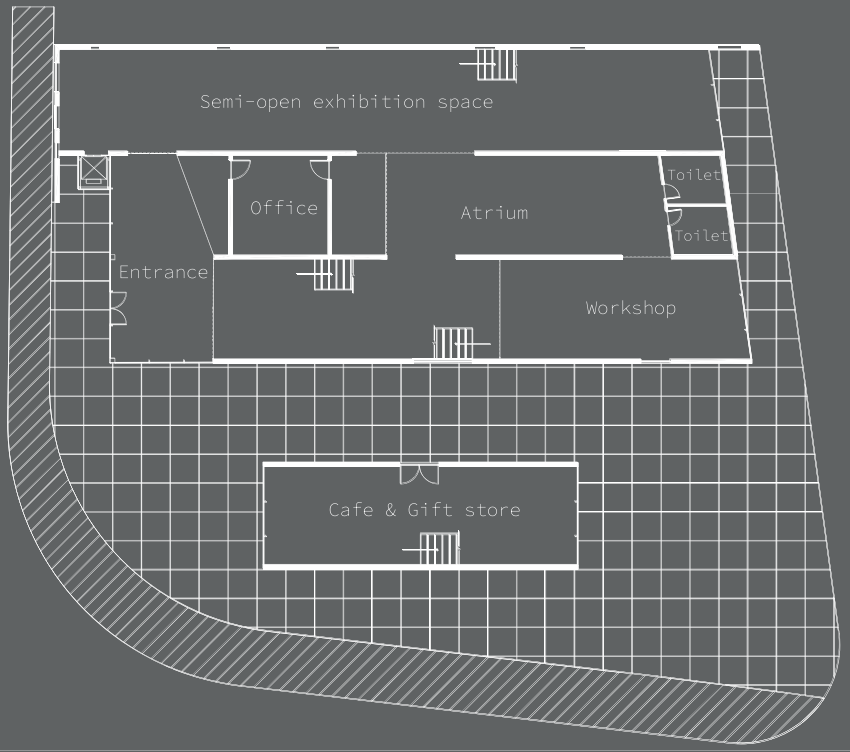
Degeneration of facade

First floor

Master plan



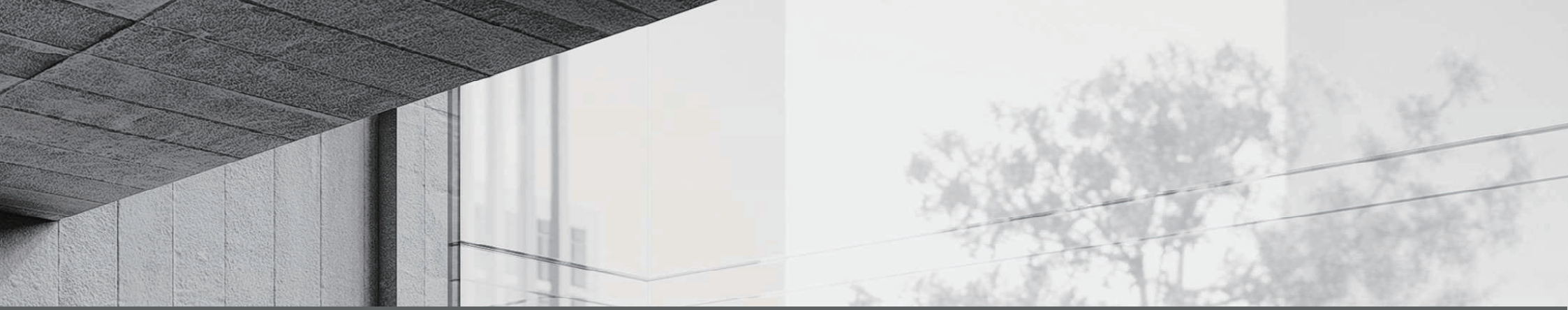












Mixed community estate design

Group work, from Nov.2018 to Jan.2019, Tongji University

Student: ZHANG YIWEI, ZHU DAXUAN, YIN HAIXING

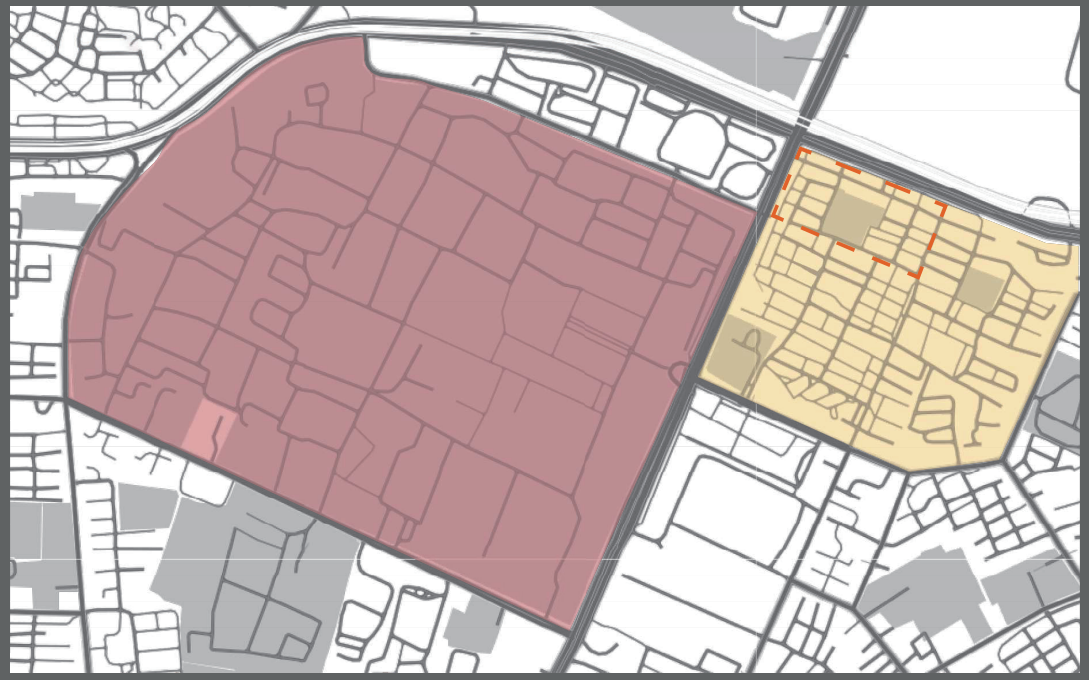
Teacher: TU HUIJUN

Personal work allocation: Apartment overall design, ‘O’ shape students’ apartment overall design, ‘C’ shape students’ apartment facade design and part of questionnaire design.



Site Environment

The target of this project was providing an experimental community near Tongji University for students just graduated, young teachers preparing for marriage and professors who held a whole family. These 3 categories not only focused on the living conditions of young people in Tongji University but also literally indicated typical living modes of young people in China nowadays and presented us with the social problem to solve as architects.





Tongji University

Tongji New Village

Site

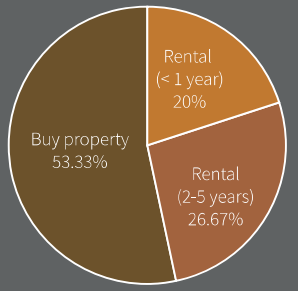
Literally,the community of Tongji New Village ,area in which the site located, was built around 40 years ago to provide residdence for teachers and professors who came to Tongji. However, life nowadays has changed dramatically from those in the past and problem of lack of residence has become worse in Shanghai and the needs from different people varied greatly. A more compacted, diversified community was needed to accommodate all the fresh blood.

Questionnaire Feature

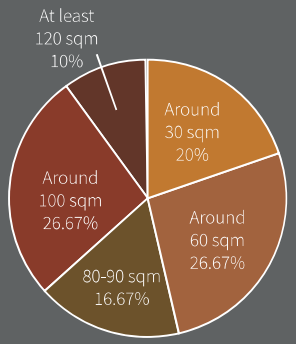
In order to create a community of diversity, we made a questionnaire to investigate their personal preference on their lives. We focused on features including:

1.Property right
2.Area of living space.
3.Members in the family
4.Expectations on environment and infrastructure...

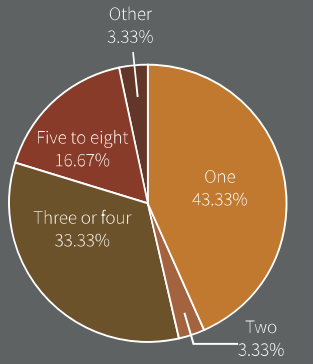
At last we received 60 feedbacks.



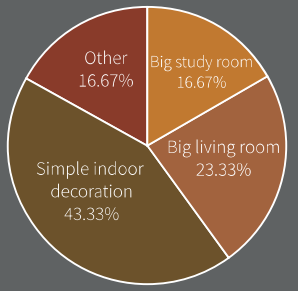
Property



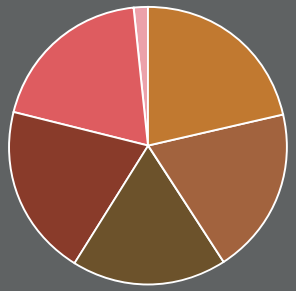
Living area

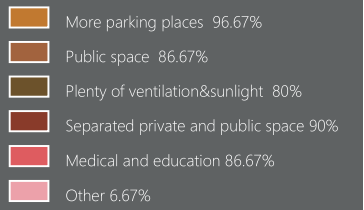


Members of family



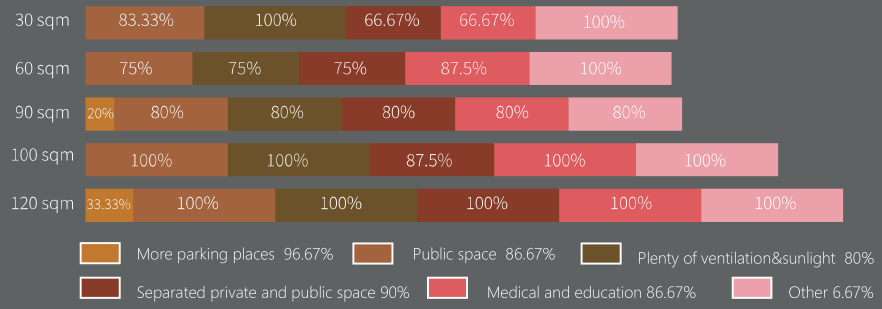
Room preference





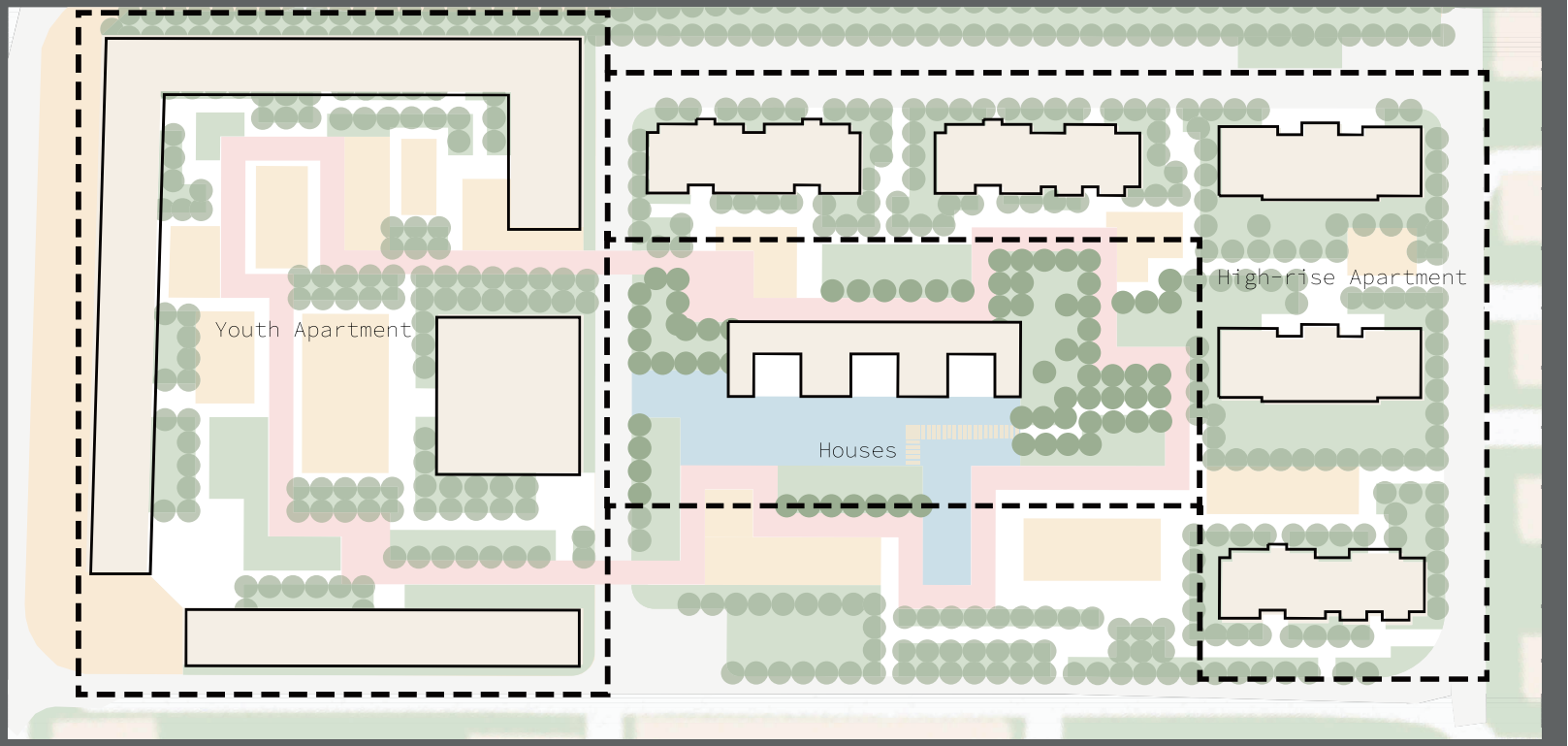
*Infrastructure preference
(Multiple choices)

Also, some second level analysis was done to support our design.

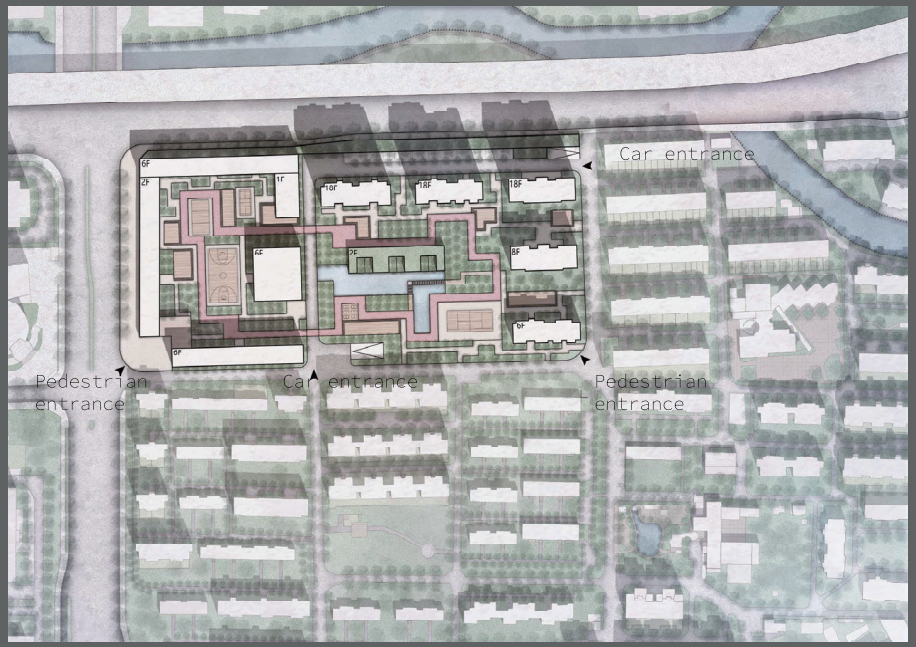


Overall design

At last we decided to make the community seperated but within a certain relation of enclosure. The red walking way plays the role of a bridge to connect the whole community together. Every part of the landscape is literally focusing on the water surface in front of the houses but also had its own points of interest. The inner yard of the youth apartment served for their needs of sports and public space. The water keeped much privacy for the houses and also rose the overall quality at the same time. As for the high-rise apartment, its height itself created a bird-view of the whole community thus high green rate in this area could make people live their feel like surrounded by a forest.

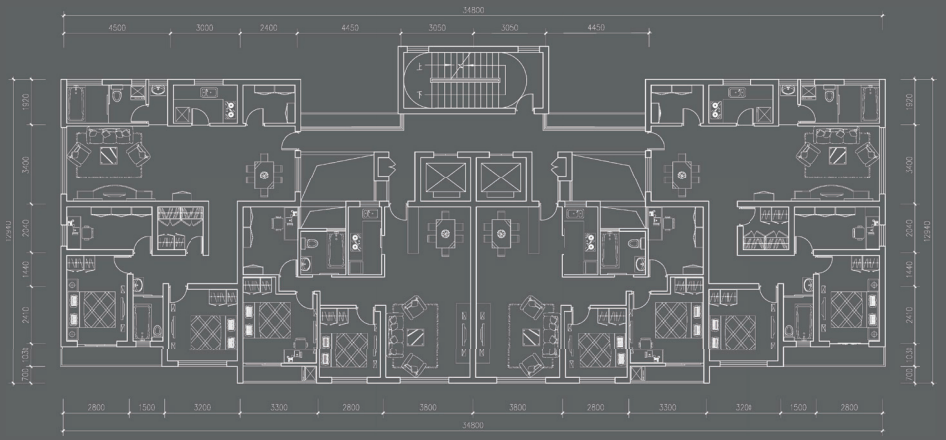


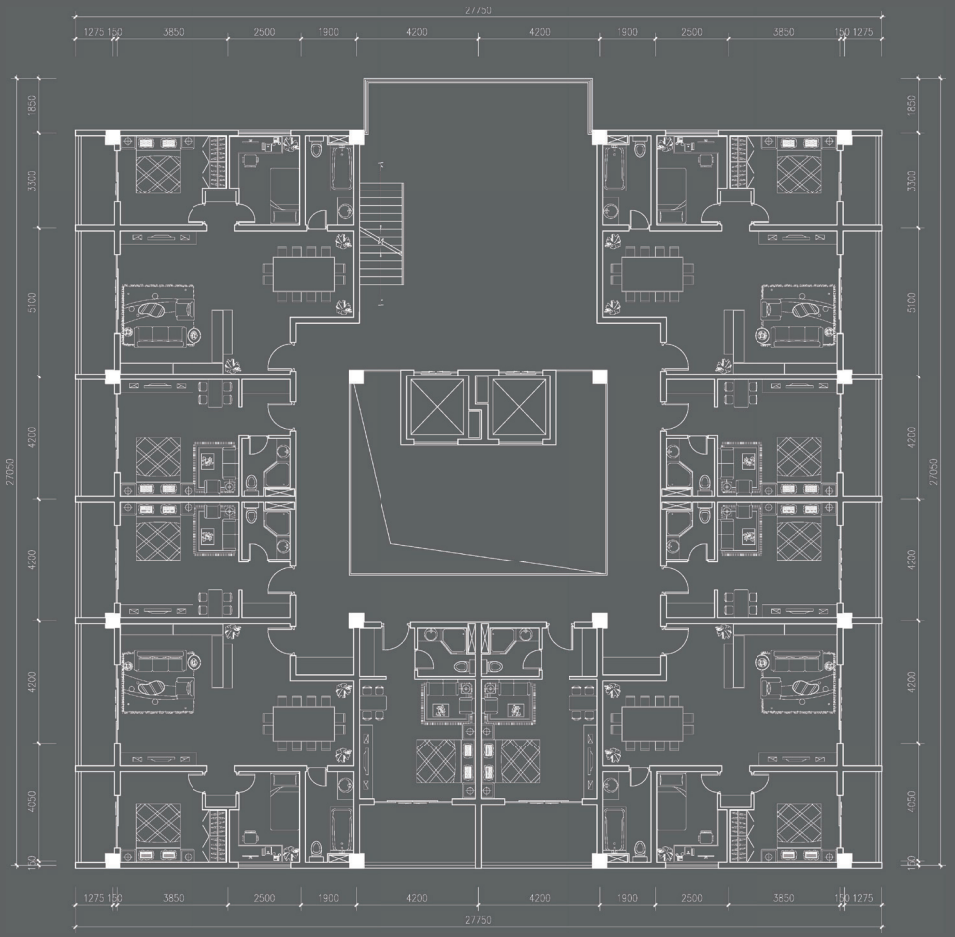
Master plan

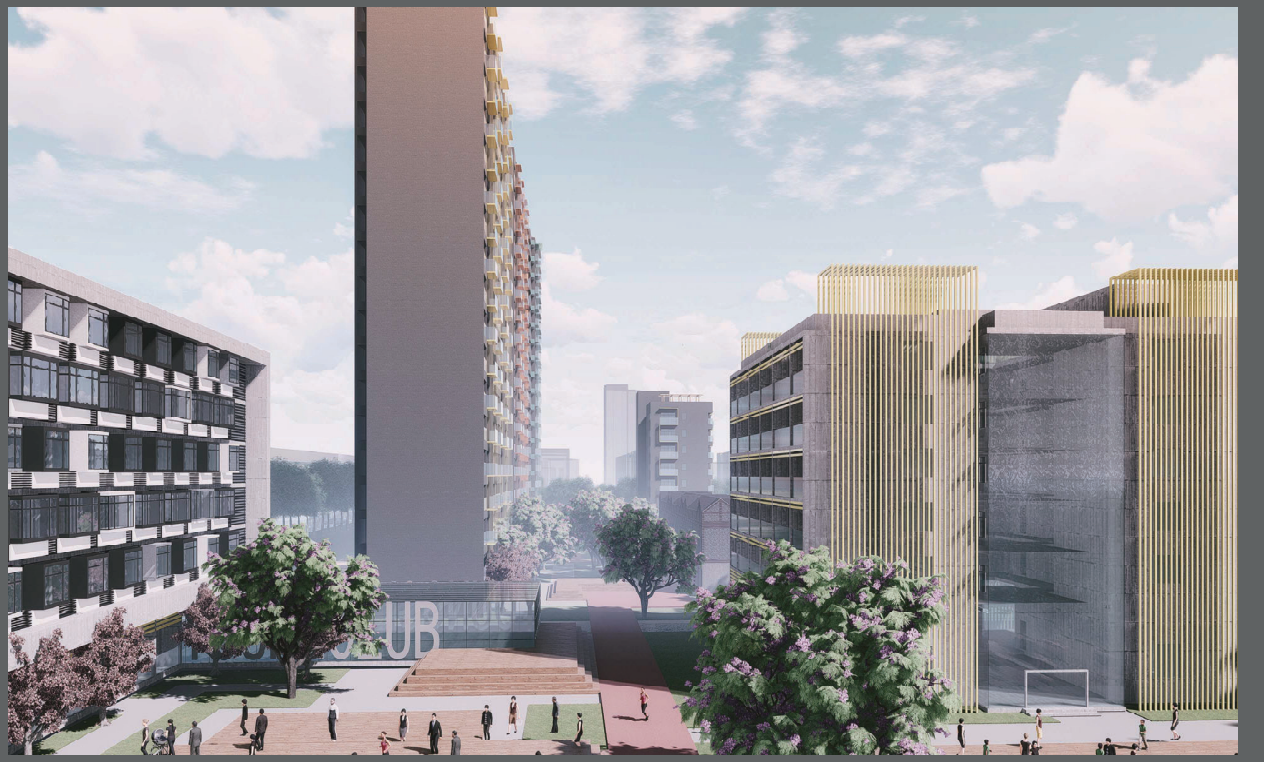




Final Results (individual part)











A closed dessert shop

Street Threshold

Reform Design

Group Work

Student: ZHANG YIWEI, ZHU ZIXIAO

Teacher: Ercu

From September to October, 2019

Individual work allocation: Time based cubside,
Public open square .

Project Information

The site was a street called Xinle Road. It was about 10 meters wide and was full of buildings built in the ealy 20th century. Though the whole street had a feel of history, it did not appear to be attracting or even tasteless because of the irregularity of building facades caused by first-floor stores all along the whole street. Accordingly, none of the store was popular for lack of fame and quality of the street.

The project aimed at discussing how we could reform this street with technologies about to come in the future to revitalize the street and providing a more welcoming environment to gather popularity.

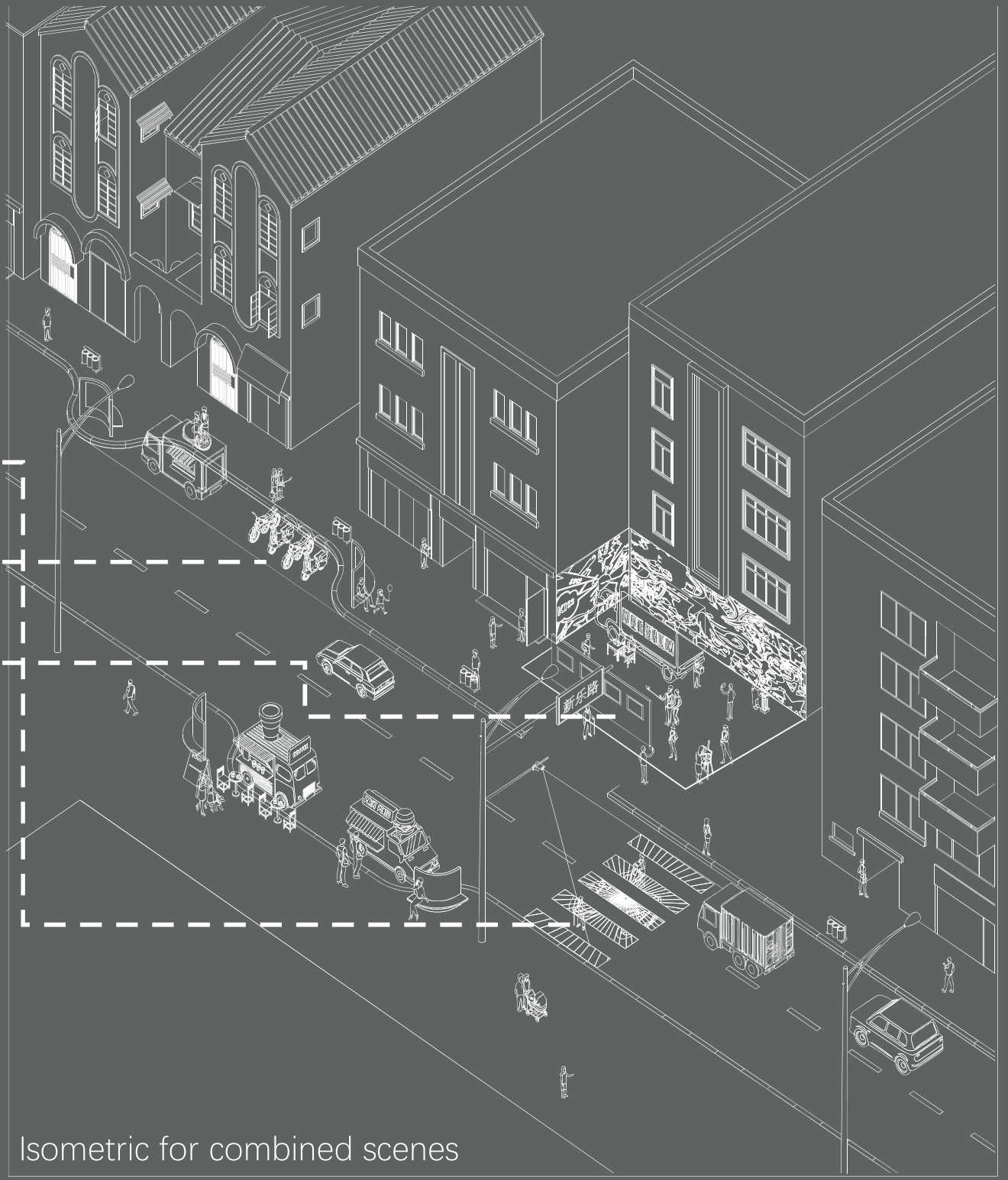
Took the given restraints of the street width and complexity of mixed function, we finally came up with 3 measures.

1.AR light crossing
A street AR light in reality generates fantastic light show to attract more interests.

2.Time based intelligent curbside management
The curbside can be reserved for parking in daytime and for temporary vendors providing services which meet the needs of local residentials at night.

3.Open truck place fo different funcions.
A small square used as public space for nearby communities and makeplace for different temporary activities that gather much popularity.

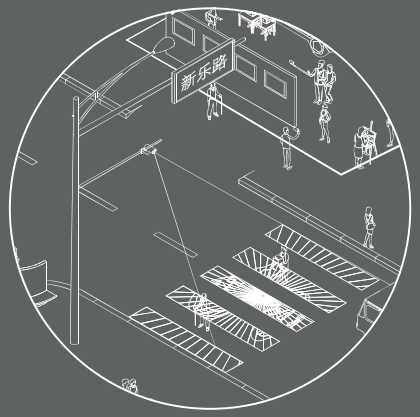




Isometric for combined scenes

Reform Measures

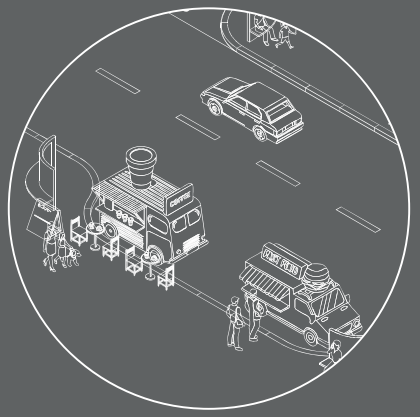
Light Crossing



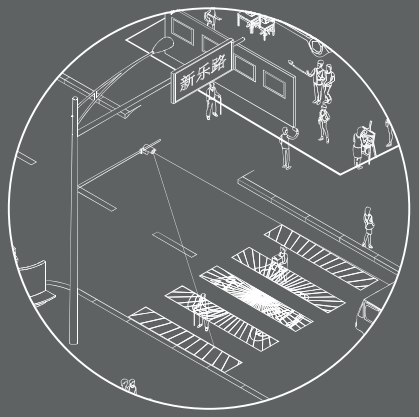
Truck place

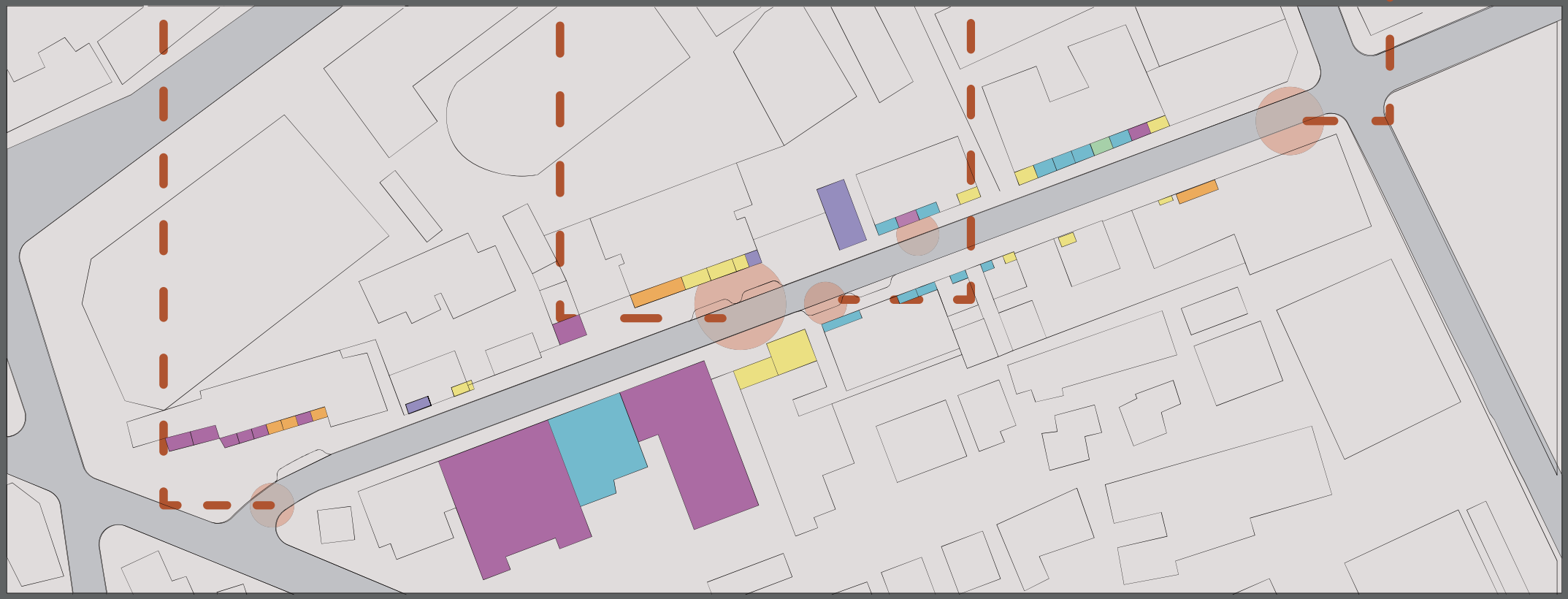


Curbside Parking



Light Crossing



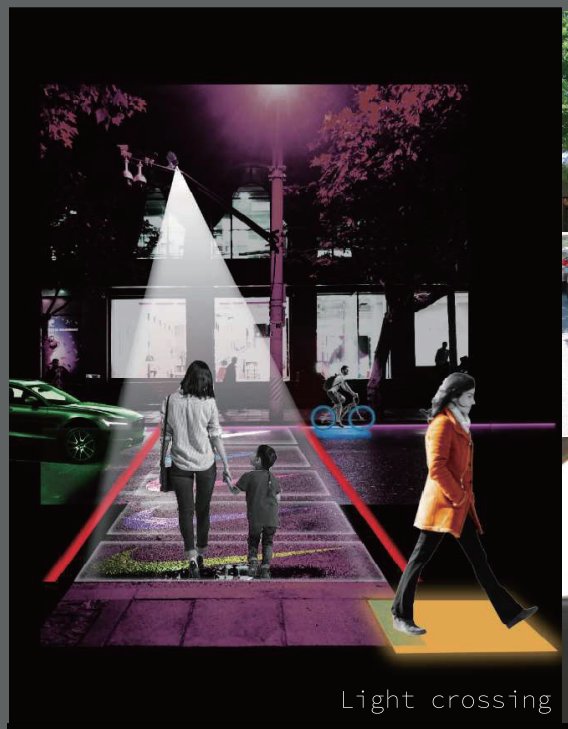


GATHERING | Health & Beauty | Shoe Retail | Clothes Retail | Dining | Other Retail

Time based function

Befor we started our design work, we spent some time estimating the local life and worked out a time chart for the street function. Though most of the area are residential, people still come here after work because of some dinning houses and cafes. This situation made it possible for the street to be made used of within 24 hours.





Light crossing



Curbside parking



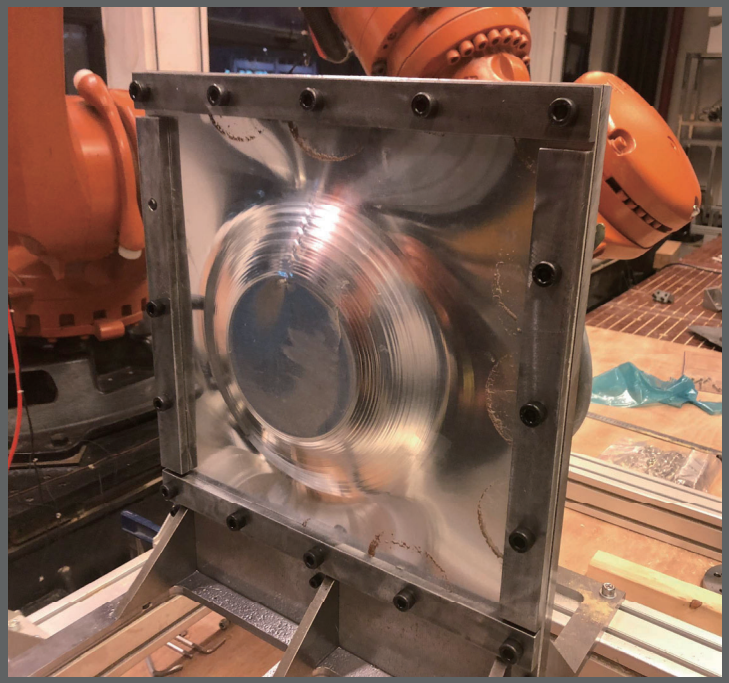
Track place

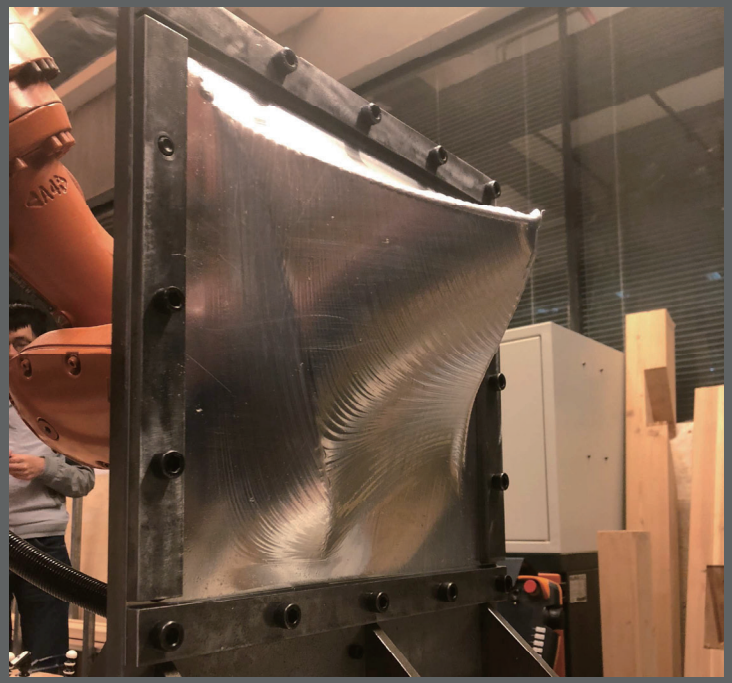
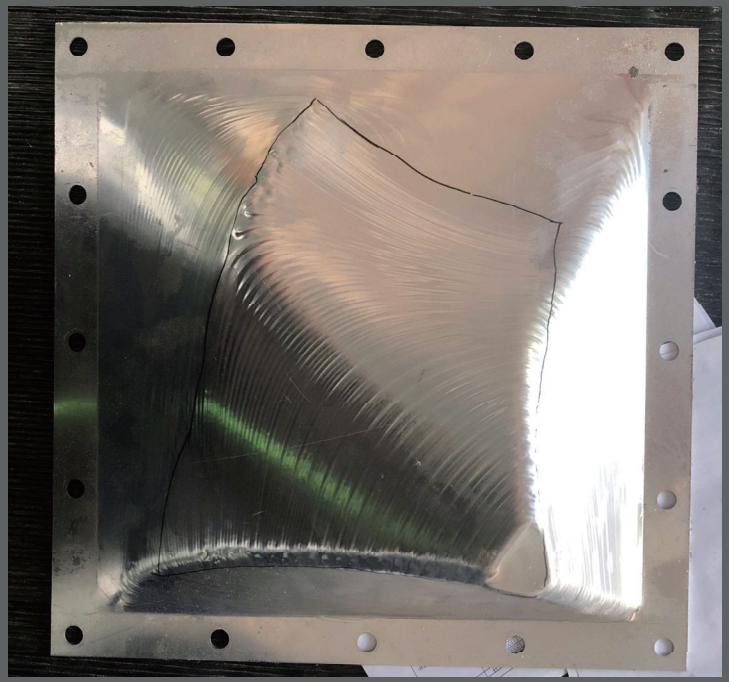
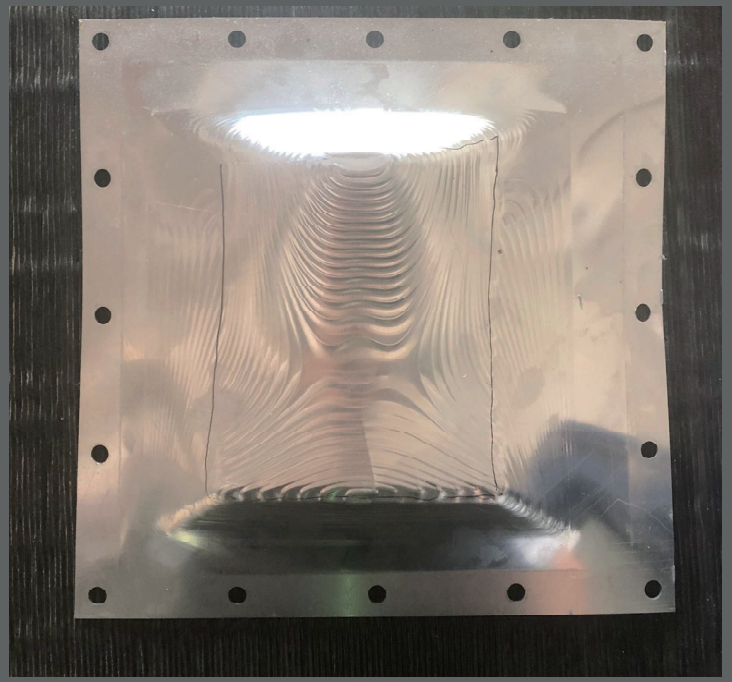
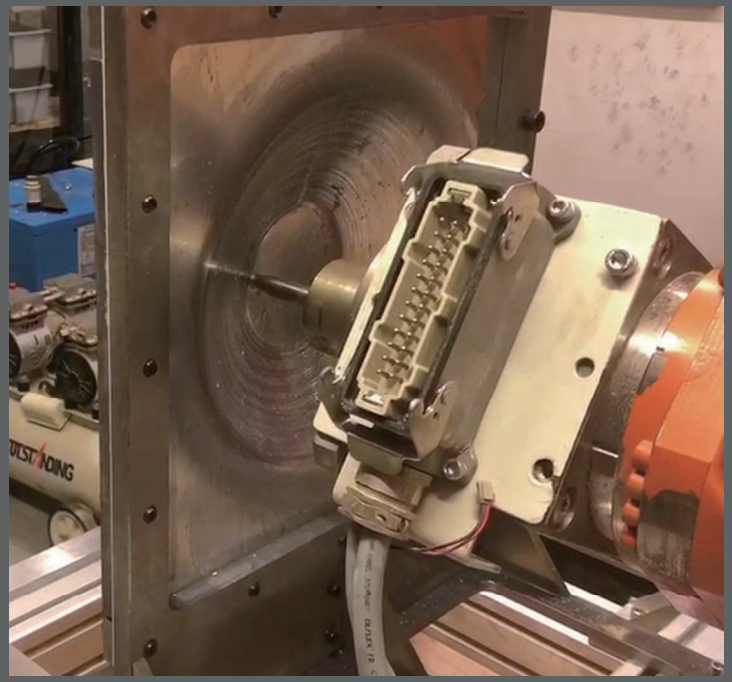


Light crossing

SPIF With Robot Arms

A small experiment carried out to make metal plates into 3D freeform sur-
daces with numerical controlled robot arms.



This is the end, THANK YOU

For any inquiries, pleas contact:
ZHANG YIWEI
- ZYW964@outlook.com
- zhang-yiwei964@g.ecc.u-tokyo.ac.jp