

REPORT AL RIENTRO DELL'ESPERIENZA DI SCAMBIO - A.A.  
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**Testo**

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Autorizzo al trattamento dei miei dati personali ai sensi del Decreto Legislativo n. 196/03 da parte del Politecnico di Milano.

Firma ZHANG SHI YU

Time flies , a semester of study in Netherlands is over , I am very grateful to school for offering such opportunity , and the support , because I really learned a lot in this period of time , I also made a lot of friends, I felt a European culture which different from Italy through talking with them. I'm deeply honored that I can study here, experience the life and culture of here.

The architecture faculty of TU Delft is very famous in Europe and even in the world, after the design studio and some theoretical courses let me strong feelings, the most impressive is it's diversity of design approach , as well as rational pragmatism.

This faculty has a lot of design studio with different theme: Interior, Public building, Methods and Analysis, Heritage design, Dwelling design, Complex projects, The why factory. Each studio teaching direction is different. For example Interior, It is not usually referred to interior design, It emphasizes on presenting some space atmosphere through the material, detail, structure etc. as well as the subjective, emotional expectation of places, it is the process of gradually concrete from abstract space, the design process of this studio is from the building environment to the interior of a complete program. And The Why Factory which I have chosen has another completely different design method, In fact this is the more ideal design method in my mind. This studio is a design and research studio, a total of 12 people to focus on one project. The great part it stressed actually is research, research is a very time-consuming and demanding work, because in this studio, the any idea about building must from a large number of research, analysis, and calculation. Each conception which formed by the subjective narrow sense of the building, will be asked "Why?" by the tutor and classmates, What we can do is to create a solution that is benefit to our subject and the people who live in our building.

Next, I will give a detailed introduction about this studio, The Why Factory (T?F) is a global think-tank and research institute, run by MVRDV and Delft University of Technology and led by professor Winy Maas. It explores possibilities for the development of our cities by focusing on the production of models and visualizations for cities of the future. Our topic of this semester is biodegradable city, the location is Amsterdam , the only limitation is in 30\*30\*30 cube. I'm confused when I heard it, how to make the building achieve biodegradability, I was thinking it from the start of the studio, I even brought out a conceive of appearance of building when the first discussion. But apparently, this is not what they want, the tutor made some explanations about biodegradable city and this studio. The studio aims to develop a method of research by design that incorporates the target of no waste in the production and consumption of the city. The idea that the city needs an increasingly bigger and unsustainable footprint to exist is not new. Nor the idea that the products and the buildings that are made of or contain toxic, non-biodegradable and hard to decompose materials is new. Yet most of the focus has been put on developing few products that are biodegradable, without much insight of the overall picture of material and energy flows in the process of building the city. And the most singular and challenging part of the studio if that we are not aiming to see a final product or design, nor aiming to find a new forms. Indeed, perhaps the form of the city can remain the same, but made of new materials and of a new architecture role if its actors. In this studio, we want to prioritize the interest in the architecture of processes, a place where energy flows, alliances of actors, energy storage devices, material composites and re-assembling techniques come together into a system that is measurable in terms of time, energy and the role of the actors involved.

The tutor divided this big topic into 4 small topics, Actor, Organic cycle, Technical cycle, and Material database, he also recommended some reference books for read, the one which deeply impressed me is Michael Braungart & William McDonough's *Cradle to Cradle*. Usually we exploit raw materials from the earth, then we produce the products by these resources, when the products too old or outmoded, then we will discard it, the result of it is landfill or somewhere. But the elements of these products are synthetic, even toxic, it's harmful for nature, it can not be degraded or it takes a long time to degrade. When we produce more and more such products, our living environment also would have more and more damage, But it's a problem of our own making. Now there's another option in front of us, is cradle to cradle, we produce products by the biodegradable material or biosynthesis material, for example wood, hemp, mushroom, bioplastic, or some kind of alloy. When you don't want keep this product, you can just directly throw it into soil, after a period of time it will disappear, biodegrade, it will also can be a nutrient for the soil. If this is a more complete product, the manufacture will collect the waste product, then the material can be reused with some processes, it become a nutrient for the next product. The entire system to form a loop, so as to achieve zero waste.

So why we are going to make this biodegradable city? As mentioned in the previous book cradle to cradle, the core issue is we live in consumer- waste society. Our desire drives us more than we want to live. We could learn from some report, consumer- waste society will kill the earth, Some resources of the earth will run out, greenhouse gases cause the earth's surface temperature rise, We need to pay attention to this issue from now on, to try to build a more moderate biodegradable city. However how can a balance between production and consumption can be achieved in a contemporary city? First of all, in today's globalized society dominated situation, the products we use, as well as the materials of the house etc. a large part of the material from the import and export trade among various countries, the benefits of doing so is that you can put the production line into developing countries with cheap labor, or import raw material from a low-price regional. These will allow you to save an enormous amount of costs, but the problem is obvious, such a large scale of system it needs a lot of connection to connect the various parts together, this connection is transportation. In the Netherlands, 499 PJ of energy is used for traffic and transport each year, which is a very large proportion, and it will also produces a large amount of carbon dioxide. But let's try to imagine If we fix the system on the small scale local scale, bring production and consumption together, If each region can achieve self-sufficiency, then in fact we can greatly reduce the waste of resources, which is the purpose of our design.

We supposed to focus on this concept to design a city-node contains all the necessary functions for living, production and construction. So when we reach this stage, we need to calculate the balance between input and output. Input is biodegradable material and system, which is consumed by us, such as energy, water, food, air, etc. And the so-called output is compost, we can use this compost to help some material's degradation, provide nutrients for this cycle.

In this city human is main actor, but this does not mean that people in this system is a pure consumer, in fact, although people will consume a lot of resources, but at the same time he will offer a lot of productivity, that is to say, people in this system is also a nutrient. We want to reach 100 % biodegradable, but we don't want to return back to farming because of this limitation, we still have some kind of contemporary requirements. So we use this biodegradable approach to design some systems & objects, such as biophone, it is made from wood and bioplastic and other materials; alginate bottle is made from algae and agar-agar, when there is no water in the bottle, the water will degraded.

As well as biodegradable car, or biodegradable turbine which be needed to generate energy etc. We analyzed the daily consumption per capita to calculate how many system and equipment we need to balance this demand, and how much space be needed for these systems and equipments, so that it is possible to obtain how many people can live in our city. We also analyzed the basic human needs in different periods of time, such as in the Netherlands, average 27 years old married, and 30 years old will have children, so this time we need to have a children's bedroom, or before 27 years old actually living room is not a necessity, through these analysis we can obtain the optimization of spatial allocation, and spatial dimensions.

The material which biodegradable is also a very important part, On the choice of material, we compared some sort of material through experiment, eventually we decide to use mushroom for the main material of resident room. A completed mushroom brick is as strong as concrete, and it far lighter than concrete, can float on the water. In our design, we have a space for compost, next to the dwelling, we can discard the organic waste inside of it at any time, when we desire a new room, we can just push the old one into the compost, after approximate 90 days it can completely biodegrade. And also our system can produce biogas, we can control the building to collect rainwater to mix the compost in ratio of 1:1, then lead the mixture into an airtight digester, it will continually generate biogas in 40 days, these biogas can directly use for cooking, bio lamp and heating. The remaining sludge need to be dewatered, after this process, we will get dry digestate. This digestate is the nutriment of mycelium, we mix mycelium with it, after several days, and then the new room come to appear. So that the whole system forms a loop.

This is our biodegradable city, although there is no exact shape design of the building, but I believe that this solution will work very well, which is also the studio's challenge lies I mentioned at beginning. The main point of The Why Factory, first I think is a clear design logic, the second is how to visualize data, these're the most important knowledge at Tufeldt, which will be a great help for my future design.

This is my exchange experience in Holland, annoyed, tired, but all worth it. Thanks again for this opportunity!