Study Abroad Report

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3mE, Delft University of Technology (TUD)
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Fig. 1 View of the City Center from the Top of the New Church

1. Application Phase

In my case, the time was very tight. When I noticed about the exchange program, it was only 1 month left before the application window closes. Therefore, I had to take a TOEFL exam in two weeks and submit a score above 90 in the end of September.

After submitting all the application materials, I started to collect scholarship information, and applied for financial support from the 'Go-Global Scholarship Program'.

It was in the beginning of the November, I received the formal notification that I was selected as an exchange student in Mechanical, Material and Maritime Faculty (3mE) of TUD. Later on, documents that were used to apply for Visa, accommodation

and health insurance were received. Following the instruction, everything was done quite smoothly.

2. Study Style in TUD

① Quarter Setting

There are 2 quarters in one semester, therefore 4 quarters in a whole year. A single quarter contains 7 weeks of lecture, 1 week of self-study, and then two weeks of examination session.

② Study Style

In most of the lectures, assignments are arranged on a weekly basis. Some of them require a team work of two person or more. I found out that it is a more efficient way to study. Because discussions could lead to a deeper understanding about the topic you are talking about. Besides, it could also improve one's ability in expressing thoughts and idea in a more clearly and precisely way.

③ Master Program

Master students are encouraged to take an at-least-three-months internship in their second year. During the time of internship, one might find an interesting topic for their master thesis. If the topic can be approved by their supervisor, one could cooperate with the company on finishing the research and thesis.

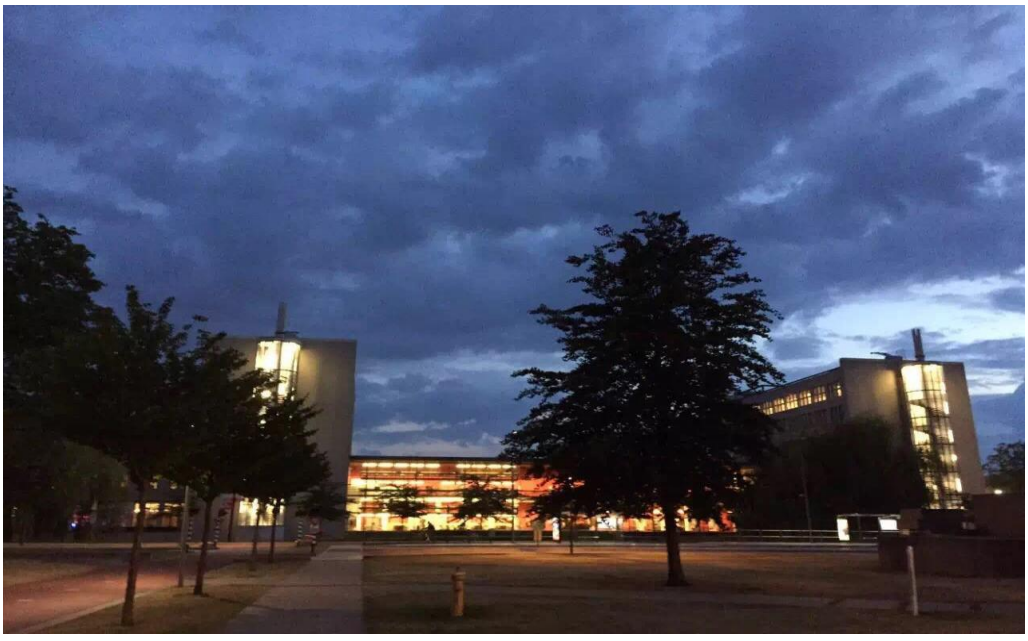

Fig. 2 Front View of the Building of Faculty 3mE

3. Lectures

The main reason that I went to study in Delft University of Technology is because the lectures they provide caught my interest. My research topic is about ship motions and control theory, which requires solid foundation of hydrodynamics and hydromechanics. However, with the background of mathematics and statistics, I felt that self-study could not support my research further more at a certain level. I should grab the chance and make a systematic study. Here are parts of the lectures that I followed:

① Lecture of Hydromechanics of Special Ship Types

This lecture was given in Quarter 3 by Prof.Keuning. The main focus was on the hydrodynamics of fast ships, sailing yachts and other advanced marine vehicles. Calm water resistance, added resistance in waves, balance of those ships was explained in detail. The calculation techniques for linear and nonlinear behaviors of fast ships, empirical formulas for the equilibrium of the forces and moment of a sailing yacht were introduced later on. A new design of hull forms called 'grinding the bow', which aims to improve the operability of fast ship was described and evaluated by making comparison with different designs, such as various length of the ship, different bow shapes. In the lecture, the main research achievements by Prof. Keuning were also introduced, such as the AXE Bow Concept.

The final assignment contains two parts. One deals with the hydromechanics of sailing yachts by means of the Velocity Prediction Program 'WinDesign', the other is about the nonlinear behavior of a fast mono-hull in waves, which involves a lot of workload in paper reading and summary.

② Lecture of Ship Movements and Ship Control 3

This lecture was given in Quarter 4 by Prof Huijsmans. It mainly deals with the motion of a ship or other floating structure in waves, as well as the maneuvering of a ship in calm water. More specifically, the sections are about the equations of motion with respects to the linear/irregular waves under time domain/ frequency domain; theoretical background of linear and nonlinear wave forces acting on floating structures; hydrodynamic calculation method – strip theory; various maneuvers of a ship such as turning circle, crash stop.

It is the course that has the tightest band with my research, especially the theory of linear/irregular motions and strip theory. The step by step study solved several questions in my mind about irregular motions.

③ Lecture of Signal Analysis

This lecture was given in Quarter 4 by Prof. Wahls, which is very useful and worthy to follow. The course builds on descriptions of dynamic systems in the Fourier and Laplace domain, from which I studied about how to describe, analyze and filter the measured signals in mechanical processes. It also provide a deeper insight into the principle of choosing sampling intervals while collecting data, the methodology of discrete-time filtering by means of Fourier and Z-transforms. Actually the Z-transform is actually concern to some control theories that I will use in the future work.

④ Lecture of Offshore Hydrodynamics

This lecture contains four parts and are given in Quarter 1 2 3 4, respectively. For students from Maritime Technology, the first two parts form a course named Introduction to Ship and Offshore Hydromechanics, while the other two parts compose the lecture of Motions & Loading of Structures in Waves. It is the most important and valuable lecture that I have taken in TU Delft, the contents of which cover exactly what I am looking and eager for.

The first part explained hydrostatics, constant flow phenomena and surface waves, which is the base of the following parts. Static floating stability, principles of loads and motions, potential theories were the main topic of the second part. The main focus of the third part gave to loads and motions in waves, nonlinear hydrodynamics, station keeping and operability. The last part stated slender cylinder hydrodynamics and sea bed morphology. All of the lectures followed a well-organized pace with easily understanding explanation.

In the second part, there is a section called single linear mass-spring system, which described in detail the operation procedure and analysis method about forced oscillation tests, radiation tests and diffraction tests. Those are the tests that I have done, however, the data are still under analyzing because of some problems. This section provides me a new perspective of those tests, and from which I think I may make a breakthrough.

⑤ Lecture of Ocean Waves

This lecture was given in Quarter 3 by Prof.Reniers. It explained the observation, analysis and prediction of wind-generated waves both in open sea and costal area. The discussion was conducted in deep water and shallow water conditions. A statistical description of ocean waves was given following the spectral technique. The evolution of wind generated waves in oceanic and coastal waters was addressed in the end.

This course benefited me directly after I came back Japan. In February 2016, I had an open sea trails on a model ship, the wave surface elevation was needed to be collected and analyzed. The knowledge that I gained in the course provided me a clear idea of how to deal with the sampling frequency, data duration, data analysis and so on.

4. Life in Delft

① Normal life

From Mondays to Saturdays, most of the shops are closed at 5pm, while supermarkets are around 9pm. On Sundays, only some of the supermarkets and restaurants are opened. There is no 24-hour convenience store in Delft.

On each Thursday and Saturday, an open market will be held on the streets as well as on the main square of the city center. Where one could find fresh vegetables, fruits, cheese, flowers, second hand stuffs, antiques and so on. It is said that the most delicious muffin in the city could be found there.

Fig. 3 A Corner of the Open Market

② Transportation

The most popular transportation tool in the Netherlands is bicycle. Especially in small towns like Delft, a bike could take one to everywhere one would like to go in a short time. What makes riding bike more convenient is that the opposite directions bicycle lanes are available on both sides of the streets. However, one should pay high attention to the bike thieves.

③ Hospital

Getting sick might be a complicated situation to handle. The Netherlands has a very different procedure of seeing a doctor comparing to Japan. One should go to see his/her family doctor at first, only if the doctor could not handle it, then one can go to a hospital.

④ Accommodation

DUWO provides several accommodation options for exchange students, some are far from campus, some are inside the campus; some are individual-room, and some are shared-flat. What I chose is a shared-flat, which consists of 8 bed rooms, one big kitchen, two shower rooms, two toilets and one laundry room. Although it was a little crowded, I enjoyed the happy hours that shared with my rummies.

5. Before Return

① Deregistration

It is very important to deregister the citizenship in the city hall before leaving, otherwise a lot of documents might be continually sent to where you were living, which may cause the leakage of private information, moreover may bother the people who is currently living there.

② Closure of Bank Account

There is a fee of holding a bank account which is charged on a monthly basis. Although one emptied his/her account, the fee is still being charged until it is officially closed.

③ Cancel OV chip card and others

Please notify all the necessary companies or shops that you have signed service contract with, and cancel the service before departure.

6. Acknowledgement

I would like to express my sincere appreciation to the 'Go-Global Scholarship Program'. Without the kind financial support, the life would be very tough for me in the Netherlands.