DeMaMech Exchange Student Report

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Faculty of Science and Technology

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Technical University Berlin
Engineering design and methodology
Dept. of Mechanical Engineering and Transport system

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2. Executive Summary

I started my overseas life in the Netherlands from 22/08/2005. Before all lectures in TU Delft began, the guidance for all exchange students was done, and I could meet many foreigner students as well as all Japanese exchange students. There was sometimes the meeting for exchange students, and the meeting was good opportunity to make my friends. I took the lectures in TU Delft, such as Engineering dynamics, Introduction to Micro system and English. All of them interested me and I could get the knowledge of dynamics and micro system. In English course, I could improve my English because the teacher taught me how to pronounce English word. I enjoyed the lectures although I did not get any credit.

I stayed in Berlin and studied at Technical University Berlin from 07/10/2005 to 31/01/2006. I could complete procedures for studying there in the first week because my buddy who could speak Japanese well always helped me. So I could start my research soon after coming to Berlin.

My research theme in TU Berlin was “Analysis and transformation of Japanese Air Cleaner for European Market”. The procedure of the project was based on “Engineering Design –A systematic approach” by Pahl G. and Beitz W. (1996). The knowledge of Production Engineering was needed for me to do my research in Japan. And I have studied on a mist collector in Japan so that air cleaner was chosen in order to get the knowledge of cleaning air. The project was carried out with my supervisor who often advised me. I could implement my research smoothly because I had the meeting with him every week. I could get the knowledge of Production Engineering and the way to clean air through the research. In order to understand Production Engineering, I took a lecture by Prof. Blessing as well as my research. The lecture really interested me and it was not so hard. I liked the lecture.

Through the life in Berlin, I could know the European culture and make many friends. I was really satisfied with the life.

3. Travel Schedule

22/08/2005 - 07/10/2005 in Delft

07/10/2005 - 31/01/2006 in Berlin

4. Research

The increasing trend of globalization has led to the world-wide cooperation among product manufacturers. This can play important role for design engineers if a product is developed globally. Design engineers have to think global in a product development process.

The purpose of the research is to adopt a Japanese house-hold product for European market. There are many differences between each country because all countries have their respective and original cultures. To understand other country's culture let to realize the market, and then it can be carried out to analyze and transform a product for the market. The project presents the analysis and the transformation of a Japanese air cleaner for European market.

At first, it was carried out to identify the overall function of the system of both Japanese air cleaner and European one. This function structure could be expressed as a block diagram showed the relationship between input and output.

Figure.1

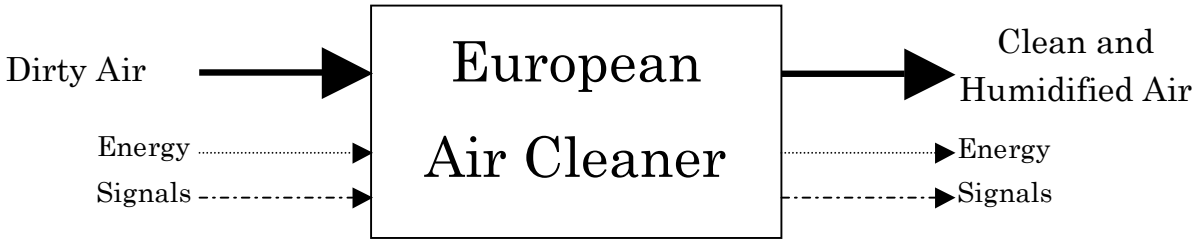

Figure.2

Japanese product can emit the negative ion with clean air. On the other hand, European one can clean and humidify air. This is very culture-specific. Air in Europe is so dry especially in the winter. So some European products have the function of humidification.

And then the sub-functions were divided in detail from the overall function. The

advantage of breaking down in sub-functions was that it would be easy to find appropriate the sub-functions for the culture and the market.

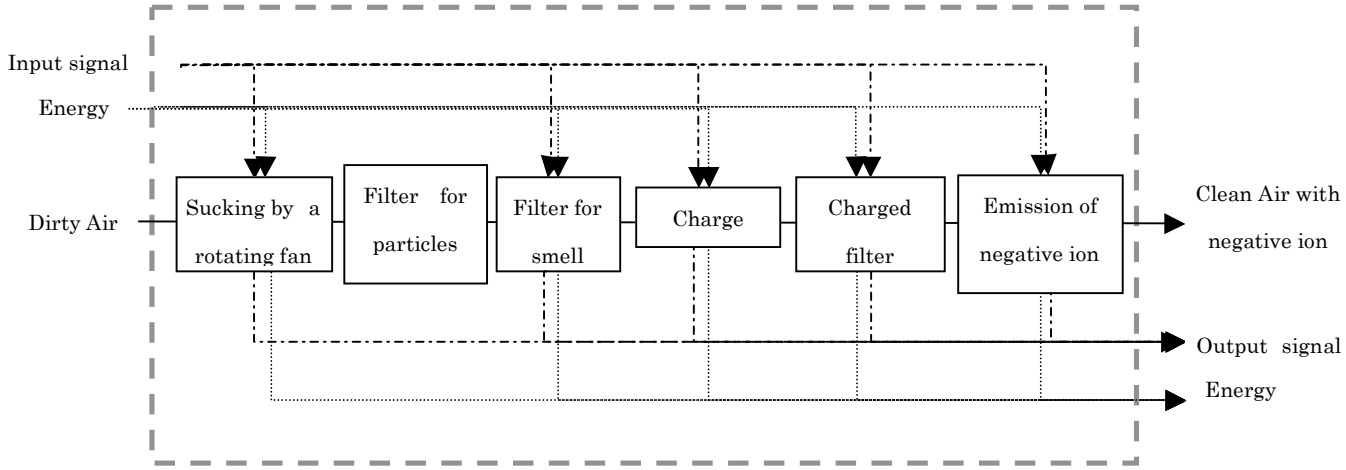

Figure.3

The sub-function of a Japanese product is shown in Figure.3. Sucked air goes through the filter for particles such as pollen or smoke of cigarette. Filtering smell is next step. Then the air is almost clean, but small particles or smells remain in the air. The air is charged and goes through the charged filter which has opposite charge to the particles. At last the air gets the negative ions and is blown.

Signals and energy are used for the function of sucking by a rotating fan, filter for smell, charge, charged filter and emission of the negative ions. For “sucking by a rotating fan”, the fan rotates. Many filters for smell have photo catalytic system which needs shiny lights for working, so the lights energy is needed for turning. And signals and energy are also needed for charging particles and filter. The function of “emission of the negative ions” can be turned on/off during an air cleaner working. The air is blown by the rotating fan which is also used as sucking air. Output signal is used as the display which shows the operating condition.

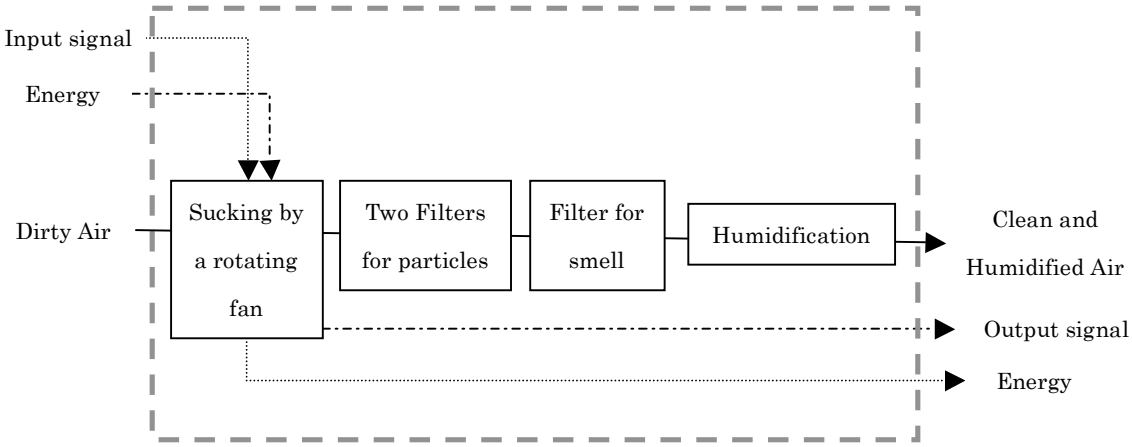

Figure.4

Figure.4 presents European sub-function. Output signal is used as the display which shows the operating condition. Output energy means energy loss.

Sucked air goes through two filters for particles which do not need energy and signal. Carbon filter is used for removing smell, so it does not demand signal and energy. When the air is humidified, water is not heated. The air just passes above the surface of the water. So signal and energy are not used.

Thirdly, the sub-functions were analyzed individually, and the specification was analyzed closely. This phase was important in order to understand the culture and the market so that this must be carried out in detail.

These analyzed results were compared and some features of a Japanese one were transformed and developed for European market.

The difference between Japanese one and European one is given on the Table.1.

"o" equals that the sub-function is adapted and "x" means not adapted sub-function.

Point		Japanese product	European product
Functionality	noxious chemicals	o	x
	exhaust gas	o	x
	Smell of raw garbage	o	x
	Smell of cooking	o	x
	Humidifying	x	o
	emitting fragrance	x	o
Geometry	no-dropping	x	o
Kinematics	direction of sucking	o	x

Force	efficient mode	o	x
Cost	Additive	x	o

Table.1

The demanded sub-function which a Japanese product does not have for European market is the humidification. The sub-function of humidification can humidify dry air. For the adaptation of the sub-function, a tank of the water, no-dropping design, 4 wheels, and adding fragrance and additive are needed.

The tank of the water has to be carried. The size depends on the available cleaning area, and the important thing is the surface area of water. This is because the dry air passes above the surface of the water for the humidification instead of electronic heating. In order to keep 40-55 % humidity, approximately 1 square meters of the surface is needed. Japanese product area which is calculated by a multiplication of width and depth is not enough so that it should be slightly bigger for the humidification. The tank of a European product is located on the underside of the product, so the height should be larger in order to keep the Japanese cleaning performance.

No-dropping design can prevent the water dropping from the tank, so it must be adapted. This function is about the design, so the adaptation of the no-dropping design is not so difficult.

The weight of the air cleaner which has the tank is over 10 kg when the tank is full. It is so heavy especially for old people and children to move the air cleaner so that 4 wheels are adapted for some European products. When the air cleaner is located above of the level of the floor, it is in danger of falling, so the stopper for each wheel is also needed.

On the other hand, some sub-functions should be excluded. The functionalities of collecting noxious chemicals, exhaust gas, smell of garbage, and smell of cooking are not needed. And different directions of sucking, efficient mode are also not demanded.

There is special filter in a Japanese product in order to remove noxious chemicals, so that the filter can be excluded. The particles in exhaust gas are bigger than those in smoke of cigarette, so the filter for the smoke may be able to collect exhaust gas. So there is no need to exclude the function. Both smells of garbage and cooking are also not needed to be excluded, because the filter for smell of cigarette and pet can remove the smells of garbage and cooking. But if the filter is specially treated for removing the smells of garbage and cooking, the processes to treat the filter should

be deleted. To reduce a process lets to reduce the cost of making a product.

The efficient mode is a kind of Japanese culture-specific because there are many Japanese people who have an allergy of pollen. Not so many people in Europe are bothered by pollen, so the problem of pollen is not serious. The mode can be excluded.

By this research, what should be included or excluded for European market was clear. And it was also clear that both products have many common points. This is because each product takes global view.

5. Exchange student life

I could enjoy the Delft life thanks to my Japanese friends, my Dutch friends and the staffs for exchange student in TU Delft.

I cooked and ate my dinner with my friends for saving money. It was good opportunity to communicate with my roommates because my house was shared with 17 Dutch people. It was difficult for me to remember their name and communicate some roommates. But I could gradually remember their name and communicate them. And the best thing I remember about my Delft life was my room party. I had the party with my roommates so that I prepared the party for a few days like cleaning the kitchen, making a pool and painting the wall. It was so big fan and the teamwork made us friendly. I invited my Japanese friends, and they enjoyed the party.

In the upstairs room, Mr. Yutaro who will come to Keio University as a DeMaMech exchange student lived. He sometimes invited me to dinner. He and I planed the meeting for DeMaMech students so that I could talk with the students who were interested in Japanese culture. It was funny to teach them about Japanese culture and I had to know more everything about Japan.

In TU Delft, I took three lectures. Engineering dynamics was so difficult for me, because I did not understand technical words the teachers spoke. Introduction to Micro system interested me, and it was my pleasure that the teacher sometimes talked about Japanese technology. In English course, I could improve my English a little because the teacher taught me how to pronounce English word. I wrote a short article every lesson and the teacher checked it. I benefited from that check.

In Delft, I experienced a lot of things in my daily life as well as in my university.

I will never forget everything in Berlin because I always felt happy and comfortable. On the first day in Berlin, Mr. Nikolaus Emmer who is a student in international office and Ms. Tina who was in Keio University as a DeMaMech exchange student waited for me in the airport. And I could complete procedures for studying there in the first week thanks to them. They often helped me, so I appreciate them.

Dipl. –Ing Vivek Gautam who was my supervisor in TU Berlin was so kind that he helped me not only for my research, but also for my private life and I could find the cheap shop.

There were 4 Japanese students through DeMaMech program in Berlin, and we sometimes had dinner and party together. They had good humor and they are my friends even now. Especially Mr. Kentaro Watanabe who lived next to my room often helped and encouraged me. I was really happy that I could make my best friend.

Memorable days were created in my accommodation. I will never forget my roommates. My roommates were so friendly that we talked everyday and we spend the long time together. We joined all room party, danced, sang a Japanese song, cooked and eat dinner, went ice-skating and so on. I can not write everything here. I could enjoy my life everyday thanks to them. So I did not want to come back to Japan, and I wanted to stay there more. I was so glad that my roommates also hoped I stayed there for longer time. I had Sushi party just before the date of my departure. Most roommates joined and all participants enjoyed because I taught them how to make Sushi and Japanese Bon Dance. I can always remember their smile. 5 roommates came to the air port together to see me off. I could not say anything because I could not stop my crying. They were my best friends and I would like to go to Europe in order to meet them in a few years. I really appreciate and love them.

6. Summary

I felt that the overseas life for 6 months were so long time, because I made fuller better use of my life. It was dreamy days. And through going aboard, I got more interested in foreigner culture and people. It is greatly big change between before and after going Europe. Anyway, this exchange program was great opportunity so that I recommend oversea education for all friends.

I really appreciate Prof. Ph. D. Dr. –Ing.E.h. Ichiro Inasaki who is my supervisor in

Keio University, Prof. Sinnosuke Obi who is DeMaMech coordinator, the staffs in Yagami International Center. And it is a tribute to all concerned that I could study abroad. They gave me the great opportunity and always helped me. Thank you very much.