

# Interim Report

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## I. INTRODUCTION

This is an interim report (for the period of June 28 to September 28, 2012) on my participation in the research fellowship program related to the Hasanuddin University's New Engineering Campus Development Project (JICA Loan No. IP-541) offered to interested faculty members and arranged in a 6 (six) month visit to a university in Japan. Thanks to the help of Prof. Manabu Kano (Kyoto University), Dr. Manabu Tsunoda (JICA) and the JICE, I was accepted to visit Prof. Hiroya Seki's Process Systems Engineering Laboratory at Tokyo Institute of Technology (TITECH). I arrived at Tokyo on Thursday, June 28, 2012, settled in to stay at the TITECH's International House at Ookayama TOKYO and met with Prof. Hiroya Seki in his laboratory at TITECH's Suzekakedai campus YOKOHAMA, at the same day.

## II. GENERAL OVERVIEW

Having 3 (three) different campuses: the Tamachi campus, the Ookayama campus and the Suzukakedai campus, TITECH (nicknamed "Tokodai" in Japanese) could be taken as a good model for the Hasanuddin University Faculty of Engineering, whose campuses are also located in 3 (three) different places: the old Baraya campus, the current Tamalanrea campus and the new Gowa campus.



Fig. 1. The International House at the TITECH's Ookayama Campus

The old Baraya campus could host the vocational, highschool level, extension and reach-out programs similar to the TITECH's campus at Tamachi. The new Gowa campus could take the Ookayama campus as the model, emphasizing on the mono-disciplinary undergraduate and graduate programs. Inter-disciplinary and multi-disciplinary research and graduate programs could stay on in Tamalanrea campus to take the TITECH's campus at Suzukakedai as the reference. By not moving those programs currently located at the Tamalanrea campus to Gowa campus, the Hasanuddin University Faculty of Engineering may still

be able to take the advantage of being co-located with other Faculties in many inter-disciplinary and multi-disciplinary research and graduate programs.



Fig. 2. The TITECH's Suzukakedai Campus

Geographically, the positions of the TITECH's three campuses relative to each other are very similar to the positions of Hasanuddin University Faculty of Engineering's three campuses. While it takes around 40 minutes by train, for instance, to go from the Ookayama campus to the Suzukakedai campus, then it also takes approximately the same length of time to go by car from the Tamalanrea campus to the new campus at Gowa.

### III. CURRICULUM AND LEARNING PROCESS

I did not have a chance to take a look at the Tokodai's curriculum and learning process in more details, yet from the limited talks and discussions I made with a few Indonesians who study at the Tokodai, I started to get an impression that the students at the Tokodai generally do not take many courses except in the first three years of the undergraduate program. Even the undergraduate students do not take as many classroom courses as the undergraduate students in Indonesia, moreover the graduate students. As a matter of fact, I rarely see students attending lectures in the classrooms, especially in Tokodai's campus at Suzukakedai. I saw the campuses are relatively very quiet, maybe because I arrived almost at the end of Spring semester and at the beginning of the summer vacation, while the next Fall semester will not begin until the end of September or the beginning of October. In many campuses in the world, especially in Indonesia, we usually see university students are busy attending classes from time to time, from one building to another, but not here in Japan, at least not here in Tokodai.

The fact that in Tokodai the students spend more time in the laboratories rather than in the classrooms is very interesting. If the Hasanuddin University Faculty of Engineering is to follow this model, then its curriculum structure should be changed from emphasizing on classroom courses like the current system into the new curriculum emphasizing on laboratory courses or research activities.

### IV. RESEARCH ACTIVITIES

From the first day at the office, Prof. Hiroya Seki has introduced me to a fellow professor who became my office mate until the end of July 2012. His name is Dr. Muhammad Shamsuzzoha, an Indian researcher who is now affiliated with the KFUPM (King Fahd University of Petroleum and Minerals) at Dhahran, Saudi Arabia. Dr. Shamsuzzoha has urged me to produce a scientific paper since the first time we met. He himself has been a productive writer since the days when he was still a Ph.D. student in South Korea. Apparently, Prof. Seki and Dr. Shamsuzzoha shared the same interest in the Process Control area,



Fig. 3. My Work Station at the Process Systems Engineering Laboratory

especially the design, modelling and control of distillation columns. They are working on a special case of distillation columns called "Divided Wall Column" or DWC [3]. Every Friday they had a weekly meeting to discuss the progress of their research collaboration, and they allowed me to participate actively.

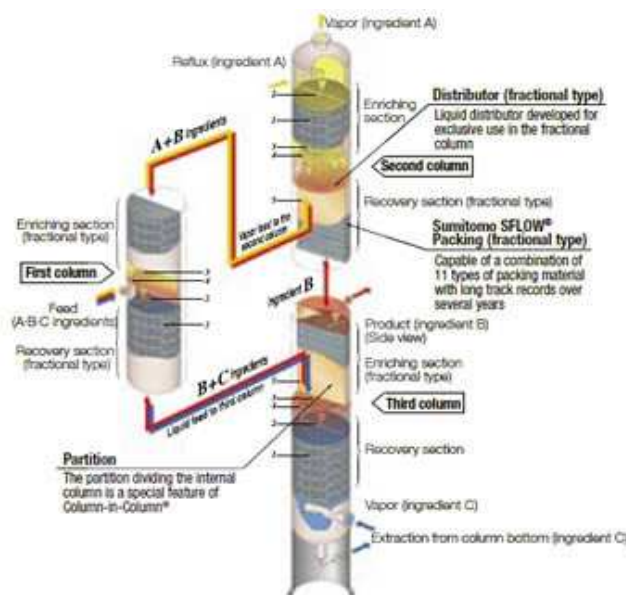


Fig. 4. An Example of a Divided Wall Distillation Column

Dr. Shamsuzzoha shared with me all his papers on "PID Tuning" [2] control systems, and suggested me to focus on that topic for my research activities. I followed his suggestion, and started to build a Simulink (of MATLAB) model of a self-tuning PID control system. We had a lengthy discussion on the possibility to implement a self-tuning PID controller algorithm design up to the micro-controller chip level to control a process control plant.

Prof. Hiroya Seki allowed me to use a modelling and design tool called "UniSim" widely used by researchers and system-designers in the process control technology. I was so unfamiliar at all with the software package so that I should learn about it from zero. Fortunately, Dr. Shamsuzzoha showed me

an e-book containing of the step by step tutorial on how to use the software [1]. I successfully built the UniSim model of a gas processing plant described in the e-book, just by following carefully the step by step instructions in the e-book. To get a better understanding on the software package, now I am still working to build a UniSim model of my own - very simple - case. In the next step, I am planning to develop a relation between the UniSim dynamic model of that simple case and the corresponding Simulink model that I am more familiar with. Then I will continue to work on the self-tuning PID control by using both UniSim and Simulink models. I am quite certain that this work will keep me busy until the beginning of December.

## V. CONCLUDING REMARKS

Originally - as stated in the statement of purpose of this program (see: <http://www.unhas.ac.id/rhiza/arsip/ke-Jepang-kah/Statement-of-Purpose-REVISED.pdf> for details) - the main goal of the 6 (six) month visit to Japan is to collect the lessons learned from the Japanese experience in the collaboration between the academic world and the real industrial world, especially in the field of process control technology. To achieve this main goal, I am still thinking of any possible way to arrange a visit to at least one of the industrial manufacturing plants in the surrounding Tokyo area. However, even if this is not possible, I think the research activities described in the previous section will certainly keep me busy in Prof. Hiroya Seki's Process Systems Engineering laboratory until December 2012.

## REFERENCES

- [1] HYSYS 2004.2 Tutorials & Applications, Aspentech, Aspen Technology, Inc. 2005, Cambridge MA, USA
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- [3] Noori Sotudeh and Bahram Hashemi Shahraki, A Method for the Design of Divided Wall Columns, *Chem. Eng. Technol.* 30 No. 9 1284-1291, 2007



\* Rhiza S. Sadjad, was born in 1957, completed his elementary and secondary education at his home town Bogor, Indonesia. He received his first college degree of Ir. from the Department of Electrical Engineering, Bandung Institute of Technology (ITB), Bandung, Indonesia in 1981, then received the M.S.E.E. (1989) and the Ph.D. (1994) majoring in Automatic Control Systems from the Department of Electrical and Computer Engineering, University of Wisconsin, Madison WI, USA. In 1981 he took a teaching position at the Faculty of Electrical Engineering, Satya Wacana Christian University in Salatiga, Central Java, Indonesia, then moved to the Department of Electrical Engineering, Hasanuddin University, Makassar, South Sulawesi, Indonesia in 1983 and has been with this department until now.. He founded the Control Systems and Instrumentation Laboratory in 1995 and has been the head of the laboratory since then. He teaches almost all courses in automatic control systems area, and has recently been interested in the process control systems and technology. He has supervised a Ph.D. dissertation (completed in 2010) to develop a process control mini-plant for industrial solid materials, and now is advising undergraduate and masters students whose final projects and thesis are related to the field of process control technology.