

# Practical training at Rachaprabha hydro power plant, Suratthani, Thailand.

## Introduction

My name is Peter Lundberg and I am a 24 year old student from Sweden. The major subject of my studies is energy engineering and I have studied in the Bachelor of Science program at Umeå University in northern Sweden. From 1 September to 24 of November I have been doing practical training with the Electricity Generating Authority in Thailand (EGAT) at Rachaprabha (Rajjaprabha) hydro power plant in southern Thailand.

The goal of my training was to:

1. Obtain knowledge of operating and maintaining a hydro power plant.
2. Learn about electrical and mechanical equipment, main parts and auxiliary systems.
3. Visit and study other power plants in Thailand, Khanom Power Station and Srinagarind Hydropower Plant.
4. Obtain knowledge of EGAT organization as well as Independent Power Producer (IPP), Small Power Producer (SPP), Provincial Electricity Authority (PEA) and Metropolitan Electricity Authority (MEA).
5. Learn about Thai culture.

When reading this report you will see the schedule of my training and read what things that can improve for future students.

## Background

Rachaprabha hydro power plant is located about 600 kilometers south from Bangkok in the Suratthani Province. The plants three power generating units can produce maximal 240 MW of electricity when needed. The Rachaprabha dam is the fifth largest hydro power plant in Thailand. The dam has approximately 300 employees where half of the staff works at the power station and the other half work in the office.

## **Schedule**

The schedule for my training was designed for training at each of the different sections in the power station. I spent approximately 2 weeks at each section. This was not the case for the planning section where I spent 3 days. During this report I will try to explain the function of every section as well as what things I have studied and learned during my practice.

### 1. Efficiency section (1-16 September)

The main task of the efficiency section is to collect and evaluate data from the power plant. The Efficiency section organization consists of 3 branches.

1. Data Management: The task of this branch is collecting data and producing daily, weekly and monthly reports about different conditions in the power plant.
2. Analyzing and testing for plant efficiency: The tasks of this branch is to analyze machines, water quality, water level in the dam, development/improving operation, testing generator equipment and to investigate problems.
3. Activity and IT: The tasks of this branch is working with web design and development, multimedia, office organization, Modern System Management (MSN), ISO 14001, ISO 9001:2000, safe energy, operation plan, internal control and performance agreement.

During my studies at efficiency section I learned how to analyze different data from the plant and how to write and send reports to the head quarter.

### 2. Operating section (19-30 September)

The task of the operating section is to start, observe and stopping the electricity generating units in the power plant when ordered by the National Control Center (NCC). The operators also report different problems that occur during operation to each of the maintenance sections. The operators work in shifts and there is always operators present in the control room. During my studies at operating section I learned how to operate a hydro power plant as well as starting-, stopping- and monitoring-procedures.

### 3. Electrical Maintenance section (3-14 October)

As the name explains the electrical maintenance section is working with maintaining electrical equipment such as for example, transformer, switchyard, auxiliary systems, PLC system etc. The electrical maintenance section consists of 6 branches displayed below.

1. Storage: Handles storage and purchase of equipment.
2. Maintenance group 1: Turbine System.
3. Maintenance group 2: Generator System.
4. Engineering group: Works with quality maintenance, revising drawings.
5. Communication group: Works with telephone and television systems.
6. Secretary

During my studies at electrical section I learned about preventive maintenance work as well as the functions of the PLC system and other electrical systems.

#### 4. Srinagarind Hydro Power plant (15-16 October)

During 15 and 16 October I visited Srinagarind hydropower plant in the Kanchanaburi province. The Srinagarind dam has five electricity units and a total capacity of 720 MW and is the second largest hydro power plant in Thailand. Unit number 4 and 5 can also operate as pumping units during night time when the electricity consumption is low. The reason for pumping water back in the reservoir when the demand for electricity is low, during night time, is being able to use this water when the electricity consumption is very high during day time.

#### 5. Mechanical Maintenance section (17-31 October)

The mechanical maintenance section is responsible for maintaining mechanical equipment such as, hydraulic systems, pumps, turbines, valves etc. The mechanical maintenance section is divided into 2 different branches:

1. Mechanical maintenance group
2. Mechanical engineering group

During my studies at mechanical section I learned the basic knowledge of preventive mechanical maintenance, as well as the basic in the hydraulic system, turbine construction, jet valve and other mechanical systems.

#### 6. Khanom combined cycle power plant (1 November)

The Khanom Power Station is one of Thailand's Independent Power Producer (IPP) and was formed in 1995 as KEGCO (Khanom Electricity Generating CO). The plant consists of 2 thermal units (2 x 75 MW) and 1 combined cycle unit (674 MW) and the fuel used in the generating process is natural gas. Located in the Nakhorn si Thammarat province and with a total capacity of 824 MW the Khanom Power station is the largest power plant in southern Thailand. During my visit at Khanom power plant I studied the technical specification and how to operate and maintain a combined cycle/thermal electricity generating power plant.

#### 7. Planning section (2-4 November)

The planning section is responsible for planning preventive maintenance for the mechanical and electrical maintenance sections. Every week the planning section produces a PM for what systems to maintenance for each section.

During my studies at planning section I learned about planning preventive maintenance and what factors to consider when planning long term maintenance.

#### 8. Thaksin University, Phattalung district (7-8 November)

My visit to Thaksin University took place in 7-8 November in Phattalung province. My host was Dr Jompod Waesak who I met about a month earlier at the Rachaprabha dam when he and some students were on a field trip. I wanted to visit the University because they offer different courses in energy technology and I was curious to know what Thai students thought about what energy sources we will use in the future. During day 1 I visited an energy exhibition in Nakhorn si Thammarat. Under display were different applications for energy saving products, for example solar cell equipment, solar collectors, combustion units for garbage and much more. It was interesting to see all the different ideas how to save energy.

During day 2 I visited a pig farm in Phattalung where they have developed a system for recycling methane gas from pig manure. The gas is used for cooking purposes and when the pig farm has 5000 pigs the farm can provide gas to approximately 200 houses.

In the afternoon I held a presentation of electricity production in Sweden for about 30 students at Thaksin University. After my presentation we had a special energy seminar where we discussed renewable energy sources and differences between Thailand and Sweden. My visit to Thaksin University was very interesting and rewarding when I had the chance to exchange ideas with Thai students who also study in the field of energy.

### **Summary**

My practical training at the Rajjaprabha dam has given me insights in the operation, maintenance, planning and evaluating of data in a hydropower plant. I also have had the chance to compare the plant to similar plants in Sweden where I also have done practical training. When comparing between Sweden and Thailand there are both similarities and differences. The similarities are mostly construction and design of the plant and the differences are mostly in the organization and working routines. As with any job there is always room for improvement and I would like to give some advises for future students. Planning is always an important issue and I would like the future students to be more involved in the daily working routines. I think this is important because practical training should give the student the chance to practice working and not only studying. I also think that it is important that the student is working with a special project during his/her training. A special report will give the student a working task that has to be completed and presented before the end of the training.

### **Final words**

I want to thank everybody at the Rachaprabha dam and the IAESTE organization that helped me during my training. The internship has been a great experience for me and I have learned many things from which I will benefit in the future.

*Yours sincerely*

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