

## **Distance Education the Old-Fashioned Way – Take Me To Your Students**

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### Abstract

During August 2000, I had the opportunity to teach a course on Transmission Line Design and Construction in Bangkok, Thailand. This opportunity came about through my summer consulting experience with GAI Consultants, Inc. (GAI). The Pennsylvania State University's Advanced School of Power Engineering hired GAI to teach the course to engineers from Thailand's Provincial Electric Authority. This paper discusses the experience, frustrations, and rewards of teaching the civil engineering aspects of transmission line design and construction to thirty-two electrical engineers in Bangkok, Thailand. The cultural exchange provided by this experience is also discussed.

### I. Introduction

Economic development and improving the standard of living in the Kingdom of Thailand is closely related to the availability of electricity throughout the country. The Provincial Electric Authority (PEA) is responsible for distributing electric power to the rural provinces of Thailand. The Provincial Electric Authority was established in 1960 to serve the majority of the country's electric distribution needs.<sup>1</sup> The service area of PEA covers 73 provinces comprising approximately 99 percent of the total land area of the country.<sup>1</sup> This includes the majority of the country outside the capital city of Bangkok. With increasing development in the Kingdom, PEA is expanding their services throughout the country. To facilitate this expansion, PEA has realized the need to establish a continuing education program to provide training for their engineers in the many aspects of power engineering. To provide the needed training, PEA has utilized the resources of the Pennsylvania State University and their Advanced School of Power Engineering.

### II. Penn State's Advanced School of Power Engineering

The Advanced School of Power Engineering has been conducted annually in Pittsburgh, PA since 1971.<sup>2</sup> The program was run through a partnership between Penn State and Westinghouse Electric Corporation until 1992, when Penn State assumed sole responsibility for the program.<sup>2</sup> Approximately 1,200 engineers from 58 countries have attended the 13-week intensive program.<sup>2</sup> The Advanced School of Power Engineering program provides a comprehensive graduate level education in power systems engineering. Topics covered include generation, transmission, distribution, operation and system planning.<sup>3</sup> The program is intended to provide a balance of

theory and practical application in developing comprehension of electric utility subjects.<sup>3</sup>

The program format consists of formal course lectures, workshops, guest lectures, and site visits to manufacturing, research, and electric utility facilities. Evening homework and group study sessions provide for extensive interaction between students in the program.<sup>3</sup> Students earn 12 graduate credits from Penn State for the formal electrical engineering courses, as well as CEUs for the non-credit courses and workshops.

### III. PEA and Penn State's Advanced School of Power Engineering

Over the years, PEA has sent engineers to attend the program in Pittsburgh. During Fall 2000, PEA had 6 students attend the 13-week program.<sup>4</sup> The costs associated with sending individuals to the U.S. for this training, however, has led to PEA pursuing a relationship with Penn State where selected workshops are offered in Thailand. By offering the workshops in Thailand, more PEA engineers are able to receive the training. In addition, PEA can select the training workshops of most interest to their needs. Penn State has provided workshops for PEA in Thailand for approximately five years. These workshops are taught by faculty from within the Penn State system, faculty from other institutions, and engineers from industry active in the various aspects of power engineering. Some of the recent workshops Penn State has offered in Thailand for PEA are shown in Table 1.

Table 1. Recent Workshops Offered by Penn State for PEA<sup>4</sup>

Power System Harmonics	Power System Transients
Power System Reliability	Power System Protection
Power System Analysis	Power Quality Engineering
Transmission Line Design and Construction	

During the past year, Penn State has presented six workshops for PEA in Thailand. One of these was a two-week workshop on Transmission Line Design and Construction. This workshop addressed the civil engineering aspects of transmission line design including siting, surveying and mapping, geotechnical exploration, foundation design, structure design, the use of integrated transmission line design software, and construction issues. The workshop was taught to electrical engineers rather than civil engineers, which proved to be quite challenging.

GAI Consultants, Inc. of Pittsburgh taught the Transmission Line Design and Construction workshop for Penn State. The engineering staff of GAI has considerable practical experience in transmission line design and has presented similar workshops in the U.S.<sup>5</sup>

### IV. Transmission Line Design and Construction Workshop

The Transmission Line Design and Construction Workshop was offered in Bangkok from August 21 to September 1, 2000. As part of my summer consulting work for GAI, I taught the first week of the two-week workshop. I had previously taught the geotechnical exploration and foundation design portion during May 1999 in the U.S. My colleague, Dr. John Mozer, P.E., taught the second week. The topics covered in the workshop and the instructors are listed in Table 2.

Table 2. Topics covered in the Transmission Line Design and Construction Workshop<sup>6</sup>

<b>Topic</b>	<b>Instructor</b>
Siting of Transmission Lines	Andrew T. Rose, P.E.
Surveying and Mapping for Transmission Line Design	Andrew T. Rose, P.E.
Geotechnical Exploration and Testing	Andrew T. Rose, P.E.
Transmission Line Foundation Design	Andrew T. Rose, P.E.
Transmission Line Construction Methods and Guidelines	Andrew T. Rose, P.E.
Development of Mechanical Loading Criteria	John D. Mozer, P.E.
Use of Integrated Line Design Software	John D. Mozer, P.E.
Analysis and Design of Transmission Line Structures	John D. Mozer, P.E.

Most previous Penn State courses for PEA had been held at hotels in downtown Bangkok. This workshop involved the use of full versions and demo versions of commercially available transmission line design software. The computers needed to run this software had considerable hardware and memory requirements. As a result, the course was held at Kasetsart University, outside of Bangkok, to take advantage of their computer labs. PEA has a partnership with the Electrical Engineering (EE) Department at Kasetsart to assist in the Penn State Workshops. Faculty from Kasetsart's Civil Engineering (CE) Department assisted the instructors during this workshop.

Kasetsart University is a comprehensive state university of Thailand,<sup>7</sup> comparable to our land-grant institutions. The University has an enrollment of over 18,000 and offers undergraduate and graduate degrees.<sup>7</sup> The University has strong programs in agriculture and forestry, as well as engineering, architecture, medicine and health sciences, and the arts, sciences and humanities.<sup>7</sup>

There were thirty-two PEA engineers enrolled in the course. The course was taught in English. A Thai civil engineering professor helped with translation when needed. The students were all electrical engineers, but many performed civil and structural engineering in their positions with PEA.

My week for teaching the course went quickly. The days typically ran from 8:30 in the morning until 4:30 in the afternoon. Morning and afternoon breaks and a sit-down lunch were as important to the Thai engineers as the lectures and workshops. The lunch was catered and the food was cooked in the open hallways and stairways of the building. The first day began with an introductory ceremony by Sanguan Tungdajahirun, PEA Assistant Governor of Planning and System Development. Group photographs with the students followed. Then we had a coffee break. Finally by late morning, we got down to business.

The class was assigned to a small computer laboratory with 16 computers. Outside some of the larger computer laboratories, I observed the Thai students placing their shoes on racks and entering the rooms barefoot or in socks. In the room where I was teaching, they made an exception, and I was allowed to keep my shoes on.

In preparing for the course over the summer, our contact at Penn State indicated there would only be eleven computers available. I only brought twelve hardware keys with me to Thailand. The

additional computers available in the classroom would see limited use. The mornings typically involved lectures and the afternoons were devoted to the computer workshops. The first day was primarily lecture with only a small Excel workshop. The students and head of the EE Department were all wondering if we really needed the computers throughout the workshop. We continued in the cramped room for three days until the head of the EE department moved us to a room with a computer for every student. Unfortunately, because of the limited number of hardware keys, some of the software could only be used on a few machines at one time. Moving the class also resulted in the time consuming process of installing the software again on new computers.

During my week of teaching, I worked closely with Korchoke Chantawarangul, Assistant Professor of Civil Engineering. Korchoke was assigned to assist me with my portion of the workshop due to his familiarity with soil mechanics and foundations. Another member of the civil engineering faculty worked with John Mozer. During the workshop, I typically would present material or a concept for five to ten minutes. Then Korchoke would summarize in Thai for the class. Sometimes he translated student questions for me to address. Occasionally he and the students got into conversations in Thai that had me wondering if I was the topic of discussion.

Most students showed a real interest in the material I presented. They were especially interested in the lecture on siting of transmission lines. They were amazed at how the process of selecting a transmission line route in the U.S. considers the impact of the proposed route on environmental, recreational and cultural resources. This was something that they do not address as significantly in their country. The students participated by asking questions and several added useful information on transmission line design and construction in Thailand, based on their work experience with PEA.

In some of our preparation for the workshop, we had not done as well as we should have regarding transmission line design and construction materials used in Thailand. We had spent considerable time converting tables and figures to SI units and developed workshop problems in SI units, only to find out that they use the metric system and not SI units. We had prepared very little on pile foundations for transmission line structures because they are not commonly used in the U.S. They are very common in Thailand. We prepared lecture notes and a workshop on wood poles but discovered they use concrete poles instead. John Mozer was able to prepare a concrete pole lecture and workshop but felt he could have been better prepared. The computer workshops were at times difficult for one instructor and such a large class. I found it difficult to keep the students active during these workshops.

August in Thailand is at the height of their rainy season. The climate is typically very hot and humid. I struggled somewhat with the heat and humidity. The classrooms at the University were air-conditioned but the hallways, stairways and rest rooms were not.

## V. The Thai People and Culture

The students, PEA management and employees were very friendly and hospitable. Our PEA host met my wife and I at the airport and dropped us off after our stay. I was driven to and from class each day. PEA managers took us to dinner after the first day of class. It took a while to adjust to the food. My wife was not fond of some of the different foods served. I encountered the food

every day at lunch. I found the deserts too sweet but enjoyed the other foods prepared. While I was teaching, our PEA host escorted my wife on a shopping excursion. She said she felt like she had a personal assistant. PEA provided our hotel and meal accommodations throughout our stay.

While in Thailand, we had an opportunity to explore the Temples, canals and shopping in and around Bangkok. The vehicle traffic and pollution amazed us, yet we appreciated the opportunity to see such a different culture. The street bazaar shopping was an interesting experience and my wife and I enjoyed bargaining with the merchants. The economic conditions observed were quite varied, yet the friendliness and respect shown by the Thai people made our stay quite memorable.

## VI. Summary

The opportunity to participate in this long distance education experience enabled my wife and I to travel to Thailand. I found teaching the Transmission Line Design and Construction workshop a rewarding career experience. The long trip (about 24 hours total travel time each way) was quite exhausting and we wish we had more time to explore the country and culture. The experience in the classroom provided opportunities to share U.S. transmission line design and construction procedures with the Thai engineers. It also allowed me to learn about transmission line design and construction in Thailand. Teaching in Thailand and experiencing the Thai people, their friendly nature and interesting culture was a unique opportunity for my wife and I personally, as well as for me professionally.

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