

**Supporting Graduate Students In An Engineering
Technology Master's Degree Program
At A Nuclear Power Plant**

By

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I. Introduction.

The University of North Texas of North Texas has had a commercial arrangement with the local electric utility company to deliver a Bachelor of Science in Nuclear Engineering Technology to the operators and technicians of their nuclear power plant for 15 years. The initial contract was for five years, but has been continued on for an additional 10 years. During this time, several members of the utility staff, who already had obtained Bachelor's Degrees in engineering, applied for graduate school and were accepted into the Master's degree program. This paper details the support that was provided to these individuals by both the utility company and the university.

II. Degree Program Description.

The earliest degrees were granted on the basis of taking 12 courses for a total of 36 credit hours and then completing an oral comprehensive examination. Two students completed this arrangement.

Beginning in 1994, the degree requirements were changed to become a thesis required degree plan that included 36 total hours with 30 hours course work and six hours of thesis. This is the plan under which five students graduated.

In 2003 the degree was changed again to permit an optional thesis at 30 hours total (24 of class work and six of thesis) and 36 hours of straight course work with written and oral comprehensive exam. It might be noted that this last change followed years of greatly reduced graduation rates in the department in spite of a growing number of graduate students.

The university provided support to the students in a large variety of nontraditional ways. In the earliest days of the program the program director would visit the site weekly for meetings with students who drove to campus for some courses. In those days, the early 90's, a student could take up to six hours of 4000 level courses and apply it to a graduate degree. This meant that

students could take two 4000 level courses on site and apply them to their graduate degree. This practice was discontinued in 2003, but survives as a “special problem” course charged at a graduate course hour rate.

III. Emergence of Videoconference.

In 1997, UNT began offering courses via videoconference that became very popular with the graduate students. Because the graduate program was offered only at night (starting at 6:00 PM), it became possible for the students to “attend” a regular session of classes by videoconference. This proved to be a popular method of participation. Tests were administered by proctors on site delivering other courses or by simply watching the students take exams and fax them on the television monitor. Much use was made of fax and email for delivery of homework and other assignments.

In some cases, the thesis proposal and defense were made by videoconference with the student and industrial representative on one end and the faculty committee on the other.

VI. Textbooks and Course Materials.

Textbooks were originally bought from the campus bookstore and delivered to the students on site. As companies such as Amazon.com and Campusbooks.com grew to prominence (and reliability) the program shifted the practice over to having the students buy them online. Course materials were delivered by hand, email, or by fax.

V. Administrative Legwork.

In most cases the students could rely on faculty to deliver materials to the campus for submittal or handling. The intent of the program was that a student never need set foot on campus, and there were many instances where that intent was met.

VI. Thesis Topics.

By looking at the list of thesis topics presented below, it is clear that the subjects were related to power plant projects in all aspects.

Table 1
Thesis Topics of Students at the Remote Power Plant Site

- a. “Susceptibility of a digital turbine control system to IEEE 802.11 compliant emissions”
- b. “Determination of the Shelf Life of Aluminum Electrolytic Capacitors”
- c. “Using Motor Electrical Signature Analysis to Determine the Mechanical Condition of Vane Axial Fans”
- d. “Effect of Engineered Surfaces on Valve Performance”
- e. “Effects of a Surface Engineered Metallic Coating on Electrometric Valve Stem Seal Leakage”

VII. Degree Completion Rate.

The completion rate of seven for eight students was much higher than that experienced by the on campus students where the rate is estimated as nine for eighty-four students.

Two of the seven students from the power plant won the “Outstanding Graduate Student Award”, and a third would have been but for scheduling of his graduation conflicting with another winner from the power plant whose graduation had been held up by administrative details.

VIII. Support of the students by the utility.

The students from the utility were already seasoned professionals, averaging in age over 40 at graduation. The utility provided the research topic, as an EPRI grant subject, or as a proprietary development of materials, or as a procedural matter that impacted the cost of operating the plant. An example of the latter is the study of storage and rejuvenation of electrical capacitors, for which no data had previously existed.

The students were reimbursed 75% of the cost of books, tuition and fees upon course completion with a grade of C or better. This reduced total degree costs to about \$1,500 spread over two to four years.

Generally management of the plant was sympathetic to the student needs in that they were also given time for meetings and critical research activity away from other assignments. Some level of secretarial support was also provided.

Perhaps the greatest show of support to the students came at graduation. The company sponsored graduation ceremonies at the site in a small auditorium that barely held the graduates, their families and friends. Typical attendance was on the order of 150 people. Hors d'ouvres and refreshments were provided for the event. And the platform party always had the company president and sometimes the chairman of the board to congratulate the students on their achievements.

IX. Acknowledgments.

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CHARLES C. BITTLE has been a Lecturer at the University of North Texas since 1997. He earned his B.S.E.E. at Lamar State School of Technology in 1960 and his M.S.E.T. at the University of North Texas in 2000. Mr. Bittle served in the U.S. Federal Service for 32 years as System Engineer, Program Manager and General Manager. He is a registered Professional Engineer in Texas.

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