

International Experience for Engineers

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The International Engineering Program of the University of Rhode Island is based on overseas internships. The program is described with its implementation in Germany. The professional, cultural and technical experience of the students are a vital contribution to the development of their careers.

INTRODUCTION

THE International Engineering Program at the University of Rhode Island, USA draws heavily from experience in other countries. In particular, the program recognizes the success of the German model of engineering internships (Praktikum) in companies. The program combines two degrees in order to produce a better-rounded graduate.

BACKGROUND

The International Engineering Program (IEP) [1] is designed to encourage undergraduate students of engineering to widen their thinking and thereby to prepare themselves for dealing with the engineering world outside the United States. It is also designed to make engineering as a profession more attractive to students who in the past have not chosen engineering in large numbers, particularly women. Since engineering usually attracts excellent students, they have many educational options. Often such students are concerned about having to choose between technical and liberal arts careers. In the International Engineering Program, such a decision is unnecessary because both paths are taken simultaneously.

The IEP also pursues the need for better-rounded engineers. A common conclusion is that four years is not enough time to produce such an engineer. Increasing the time requires motivation; the motivation in this program is the second degree.

The IEP was developed by strongly focused interaction involving the authors and the faculties of the College of Engineering and the German section of the Department of Languages. For the College of Engineering, it helped to produce outstanding graduates. For the Department of Languages, it increased their offerings and improved their enrollment, almost tripling the number of German majors.

The basic structure of the International Engineering Program is:

- five-year duration.
- two separate degrees awarded; BS (Engineering) and BA (German);
- all German language courses stress the application and the use of technical terms;
- internship for six months in a German-speaking country during the fourth year of the program;
- an engineering course taught in German, at the University of Rhode Island campus during the fifth year.

The structure of the program does not allow any shortcuts in either subject, but awards credit for overlapping courses in the same way that such credit has been traditionally granted for dual majors in the College of Arts and Sciences. The students work very hard and the retention rate is roughly half of that for regular engineering majors. Most of the lost students are not lost to engineering; they choose to concentrate on the technical end of the program.

CURRENT STATUS

The high point of the program is the internship in a German-speaking country. The first interns arrived in Germany in the spring of 1990. Five groups of interns have been placed, totalling 22 students. This includes five students in Europe in the fall of 1992 at the following facilities: Luft-hansa, Hamburg; TRW, Kaiserslautern; Vorwerk & Co., Wuppertal; Leitz Messtechnik GmbH, Wetzlar; and Hoechst AG, Frankfurt.

In the spring of 1992, three additional students completed their internships at facilities including two additional companies: Zahnradfabrik in Friedrichshafen, and Ewag GmbH, Solothurn, Switzerland.

Perhaps the best example of the successful operation of the program, from the perspective of industrial employers, students, and the university is personified in two specific graduates. Both of these students had worked at a Hoechst facility in Coventry, RI, in the United States, prior to their

internship in Germany. Their internship was at Hoechst AG in Frankfurt in the fall of 1990. Both are now employed in the Rhode Island facility of the Hoechst company, here they have continuing contact with their European colleagues.

The program is most effective, from a company viewpoint, if the student follows the above example: work with the international company in the United States prior to the overseas experience and then work with the same company in Europe, and return to work with the company, either in the United States or elsewhere. Of course other companies can benefit by recruiting these graduates with European experience, even if their internships has not been with their company.

International Engineering Program students currently in the program benefitted from a well-organized, two-week tour of Germany last spring (1992). The trip was partially supported by a grant from the German Academic Exchange Service (DAAD). The trip was conducted primarily in German and included 23 students with at least one year of German language study. The tour started in Frankfurt and continued through Mainz, Wetzlar, Hameln, Berkel, Hamburg, Flensburg, Lübeck, Köln, Frierichshafen, Kaufbeuren, München, and Würzburg. The well-organized tour included visits to several engineering firms as well as technical universities and cultural sites.

The internship program, at the heart of the program described here, has involved 25 students over the past three years. The number of companies working with the program exceeds 25 and internships are available to students in mechanical, electrical, computer, industrial, chemical, civil and environmental engineering.

Graduates of the International Engineering Program have been recruited by major international firms, especially German firms located in the United States or US firms with investments and facilities in Germany. In addition, other IEP graduates have chosen to continue their education in graduate programs in the US.

The IEP has been recognized and supported by the US Department of Education in an innovative program and by the American Council of Educa-

tion, and the Association of American Colleges as a model to be followed. Most recently, the IEP was recognized by the US Accreditation Board for Engineering and Technology (ABET) as one of the two national programs in engineering innovation.

Perhaps the best recognition comes from the colleagues in the educational field. The IEP has been chosen as a model for similar programs at the University of Maryland and University of Pennsylvania.

CONCLUSION

The key to the International Engineering Program is the overseas internship. In this situation, the learning is on a very personal level, where students learn directly from international practitioners—people practising the engineering profession with a different culture and language.

The students learn that, although the scientific and technical base of engineering is the same throughout the world, the practice of engineering varies considerably. There are different methods of both analysis and design. Support functions vary widely, from situations of strong technician support to those where the engineer works very independently. Personal relationships between the engineer and other co-workers also varies widely, as does the status of the engineer in different cultures. The cultural and language components cause real change in students; a change not only in capability, but also in self-confidence and self-appraisal.

Other areas which cause educational changes in students are technical differences between the US and European engineering programs, for example in the mix of theory and experiment in the curriculum. Other significant differences include living arrangements, work habits, work hours, vacation schedules, and meals. With very little effort, one could make this list much longer.

The most important aspect of the International Engineering Program is that it gives students the opportunity to experience a foreign culture and language; this experience changes their view of the world, and their own profession.

REFERENCES

1. H. Viets and J. Grandin, A combined undergraduate program in engineering and German, *Int. J. Appl. Engng Ed.*, 7 (6), 467-469 (1991).

Hermann Viets has been President of the Milwaukee School of Engineering since July 1991. He has previously served eight years as Dean of Engineering at the University of Rhode Island. He has been a professor and administrator at West Virginia University and Wright State University. He has a first-language knowledge of German.

John Grandin is the Chair of the Department of Languages and Professor of German as well as a Kafka Scholar at the University of Rhode Island. He co-founded the German Summer School of the Atlantic and has been a leader in the development of applied language curricula. Most recently, he served as the Dean of the College of Arts and Sciences at URI.