

Enhancing a Motivation for Engineering

Listening the other day to a speech by a leader in the field of chemistry, I was dismayed to hear him attribute the recent developments in many fields, such as clothing, plastics, fuels, etc., entirely to the efforts of chemists. There was no mention of the chemical engineer. I fear that the engineers themselves are partly to blame for this and for the general lack of understanding by the public of what the role of the chemical engineer is in modern society. The millions of dollars that are now being poured into chemical research every year are not given for the purpose of satisfying the curiosity of the research scientist. The funds are granted with the very definite hope that eventually the discoveries will be applied for the benefit of society. It is the engineer on whom we must depend to take the results from the laboratory and put them to use. He is the middle man between the scientists and society. As such he has a great responsibility and a very challenging opportunity for creative effort. The rewards can be great not only in monetary return but in the personal satisfaction of having accomplished something of benefit to mankind.

These facts may be well known to us as engineers, but we do not seem to be getting the message across to others. Too many of our talented young people are choosing science rather than engineering in our universities. Furthermore we are actually downgrading engineering in our curricula by introducing more and more science at the expense of engineering, even to the point, in some cases, of squeezing the engineering content out entirely. I do not underestimate the importance of a good grounding in science for one who is expecting to apply it intelligently and creatively, but is it not equally important to expose the student of engineering to courses designed to give him a taste of what engineering is?

There are some who, following the pattern of law and medicine, would relegate all courses in engineering to the graduate school. I think this would be a mistake for at least two reasons. The first one is that a student who is contemplating a career in engineering usually has a strong interest in application, and this motivation should be fostered and certainly not ignored until after four years of college. The second reason is that there are many challenging opportunities in industry for the man who does not intend to become a professional engineer but who needs

the engineering background that has in the past been well provided by the four-year curriculum. I believe that such opportunities for useful service in industry will be with us for many years.

In the undergraduate course giving the student a taste of engineering should be done in two ways. First a course early in the student's career, perhaps the second year or maybe even the first, should introduce him to professional work even though of a rather elementary character. This should not be a purely descriptive course but one which involves small projects of an engineering nature and is quantitative. For general reading to accompany such a course and in fact for anyone, including engineers, who wishes to understand the impact of engineering on modern life, I recommend three books that have recently appeared, namely: "An Introduction to Engineering Design" by Edward V. Krick*; "Listen to Leaders in Engineering," by twenty-two distinguished engineers†; and "The World of Engineering," edited by John R. Whinnery.** The second course would come in the last undergraduate year and should be a course in design which offers the student an opportunity to come to grips with a real engineering problem and a chance to find out how well he can apply some of the things he has learned. Let me emphasize the point that this is not to teach him how to design. Industry can do this better. Its main purpose is to give him a taste of what engineering involves. He will soon find out that it involves a great deal more than science. If we fail to give the student this kind of an indoctrination into professional work, is it any wonder that he mistakes science for engineering and gets the impression that engineers are just second-rate scientists?

My final point also has a bearing on the question of education. More and more basic research in science is not going to lead automatically to more applications useful to man. We already have more science than we know how to use. In my opinion we need to educate more men in the art of using this great store of scientific knowledge. This means that we need to educate men who are *motivated* to apply science. This is a task which the schools should undertake; it should not be left for on-the-job training.

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* Wiley, New York (1965), † David McKay, New York (1965), ** McGraw-Hill, New York (1965).