

LETTERS

Some Remarks on the Shortage of Engineers

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SIR:

Many articles have appeared recently in which it has been pointed out that the demand for engineers by industry is not adequately satisfied at present. Extrapolations have also been made as to the future prospects, and it seems that the shortage of engineers is likely to become worse, unless the present trends change rather drastically. The reasons for the present shortage and possible measures to increase the supply of engineers in the future have been discussed in detail. These problems, therefore, need not be treated here. It is only my intention to add a few remarks on the subject of using engineers efficiently—a subject related to the shortage of engineers, but one which has not been as strongly emphasized so far.

Engineers before the war

Almost up to the beginning of World War II, the engineers who were engaged in industry were concerned largely with production and construction problems. For these problems, as for any difficult assignment, ingenuity, experience, and organizational skill was required, but an intensive academic training in science and technology was usually not essential. Calculations and analyses which had to be performed were mostly of a routine type and were assigned to the junior men. The successful engineer would devote more and more of his time to managerial problems, and less to actual technical analyses.

Ever since World War II, and the rapid growth of aeronautics and electronics, industrial technology has become so complicated that engineers highly trained in the sciences are needed to cope successfully with the problems that present themselves.

Engineer—or manager?

The leaders of industry and education have recognized this need clearly. Industry in general, and particularly the aviation and electronics industry, has employed a large number of engineers. In integrating the engineer into an industrial organization, however, the older concept of the function of the engineer still largely prevails. Scientific ability is still—often unconsciously—considered of secondary importance, and the engineer's standing in his company is most often determined by his organizational and managerial aptitudes. The analysis and solution of technical problems is frequently left in the hands of the junior personnel—often with a minimum of guidance from their seniors, whose time is taken up with managerial duties.

Secondary consideration

The feeling that the technical work of an engineer is of secondary importance is indicated quite tangibly in another way. In many companies, the engineers concerned with technical problems are housed in large warehouse-like structures along with typists, file clerks and draftsmen. Some of these structures may contain several hundred people, the number being limited principally by

the space taken up by the desks and file cabinets. The general atmosphere and noise level in such a building is not unlike that in the waiting room of a Greyhound Station—an atmosphere certainly not conducive to intellectual work. It seems probable that each engineer could work twice as effectively if he were given more suitable working conditions, for example a private office. Nevertheless only a few companies have felt that the necessary capital expenditure for such an arrangement would be warranted. It may be pointed out that this expenditure is not at all an enormous one, certainly not when compared with the capital expenditures which have to be made to provide the tools for a machinist.

Non-technical tasks

One other instance which illustrates the inefficient use of the engineer's time is the fact that those who are actually engaged in the technical phase of engineering are often burdened with additional non-technical tasks which could as well be performed by persons without technical training.

A subject which is related to engineers' positions in industry is that of salary. It is true, of course, that engineering salaries have increased significantly in the last few years. Taking as an example offers made to BS graduates from the California Institute of Technology, one finds that the average offer in 1951 was \$305 a month and in 1955 it was \$395 a month. Expressed in terms of hourly wages these salaries correspond to \$1.75 and \$2.78 respec-

tively. In order to obtain the proper perspective for these figures it is necessary to compare them to certain other wages and earnings. Some of these are listed in the following table:

Average Hourly Wages	1951	1955
Durable goods mfg.	1.68	2.00
Skilled labor— construction	2.66	3.25
Automobile industry	1.90	2.30

Corporation Earnings		
Av. earnings per share (Moody's 125 stock avg.)	7.44	10.90

Comparing the engineering salaries to the data in the table, one finds that engineering salaries have increased in line with the other indices. The great shortage of engineers is, however, not reflected to the extent one would expect in an economy governed by supply and demand.

It should also be noticed that the salary for the beginning engineer is

below that of some of the skilled labor groups. Although the beginning engineer is here compared to a group which is already experienced, the comparison between these two groups seems justified, since the time required for the workman to acquire his skill is probably not more than the four years spent by the beginning engineer to acquire his training.

Relieving the shortage

Looking over the foregoing brief comments, it seems that certain steps could be undertaken to relieve the engineering shortage by more effective use of the presently available talent. To this end it will be necessary for the managers of industry to regard the engineer as a trained professional person, to make full use of his specialized training, and to

provide him with adequate working conditions. Salaries may have to be increased to attract the necessary number of qualified persons. If so, this should not be considered a detriment by industrial companies. On the contrary, if engineering salaries were increased significantly, companies would not be able to afford inefficient use of the engineers' time, and, as a consequence, more engineering services might actually be rendered per dollar than at present.

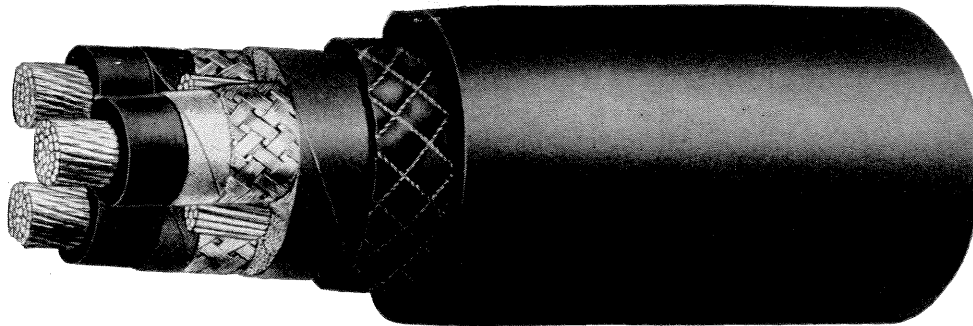
If industrial management will recognize engineers as professional people, it will, of course, have the right to expect performance compatible with professional standards. There is no doubt that the engineers of today will be able to meet this challenge.

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