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# The Month in Focus

## ENGINEERING EDUCATION

THE September issue of the "Journal of Engineering Education" carried a report on "The Future of Mechanical Engineering Education" by Colin Carmichael. While the article is directed to mechanical engineering, it also has a basic application to the whole field of engineering education. This report is particularly timely, since much thought is being given to modifications and possible improvements in the methods of preparing men for the engineering professions. Most engineering colleges were thrown into a changed curriculum by the army and navy training programs. As these programs terminate, each college is faced with a reconversion problem. As long as there is to be reconversion the question in many cases takes the form: What shall the new curriculum be? Shall it remain as it was before the war? This reconversion period may provide an excellent opportunity to clean house and to make a fresh start.

Continuation of accelerated year-round operation has received unanimous opposition. The continued close application of the student in the classroom leads to a tired, restive attitude by both students and faculty, and further, a "soaking period" is not provided. The accelerated program has served its purpose of speeding up training to provide the armed services with trained technical personnel; it should be considered only as a war necessity and now eliminated.

### Emphasis on Fundamentals

The report presented by Colin Carmichael is based on the cooperative effort of 12 industrial representatives and 15 academic representatives. The report directs some criticism to a tendency toward overspecialization and indicates the desirability of doing a better job of preparing men in fundamentals by which they may be in a better position to grasp the details of technical procedures upon entering industrial employment. This attitude is in line with that expressed in the Month in Focus in the February, 1945, issue of "Engineering and Science": ". . . the colleges train individuals in fundamentals which serve as the foundation upon which industry must build the training of its employees in the specific skills."

The report states, ". . . it has been suggested that engineering courses should be arranged for two groups of engineers:

"1. Men who will be department foremen, supervisors, directors, sales engineers, etc.

"2. Men who will be designers, consulting engineers, technical experts, researchers, etc."

In recalling undergraduate days, how many engineers could state with any degree of assurance in which group they should have been placed? Probably the majority were not in a position to be as specific in their choice of field as such a grouping would require. Adequate guidance might improve the accuracy of making a selection, in the early stages of engineering training. However, most men cannot be sure until they "get their feet wet" in some important phase of each group. Such a grouping may well be classified still as too much specialization.

### Coordination

What is probably needed more than anything else is a marked improvement in coordination of courses and less "pigeonholing." For example, as pointed out in the report, "Physics courses need adjustment to serve more adequately as prerequisites for later courses in mechanics, electricity, engineering materials, etc." In this attempt at better coordination there has been talk of reducing all engineering to four subjects—structures, materials, processes, and circuits—and supplementing these with humanities. As an ideal this may be excellent, but how shall the details be worked out? Undoubtedly even on this basis there will be some tendency toward isolation of certain course material. The success of coordination is entirely dependent upon the coordinating ability of the faculty.

### Shop Training

A shift of emphasis can be made toward fundamentals by the elimination of some courses whose purpose it is

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to teach techniques rather than fundamental concepts. Some engineering colleges have tried to do this by eliminating shop courses. Such an elimination has not in general proved to be wholly desirable, since it leaves the engineering student without any physical way of securing a feeling for processing operations which are so important in design. The report by Carmichael, however, indicates a unanimous opinion that the engineering college shop course given for the purpose of teaching routine machine operation and skill ". . . has no place in an engineering course." It has been argued that familiarity with processing operations should be derived by the student from industrial experience. This may well be true, but in order that certain academic work may be augmented and made to mean more to the student certain shop operations must be given with emphasis on manufacturing processes. These processes should be closely associated with design and materials. One possibility in shop courses is to shift the burden of this work to the high schools, thus bringing men to the college who have had training in the handling of shop equipment. The engineering college could then carry on from there into those processes which serve to coordinate with design. The difficulty of this procedure lies in the fact that the colleges have no direct control over the high schools. Further thought must be given to this problem.

A further point raised by the Carmichael report deserves mention. This concerns the faculty of engineering colleges. The report states, "Students are not taught by curricula but by men." These men must be forward-thinking, active individuals who maintain adequate contact with industry and research. They must keep abreast of developments and requirements in their field. Industry can assist in making this coordination possible.

This brief discussion is presented in the hope that it will stimulate reflection by engineers, all of whom should be vitally concerned with the preparation of engineers for the future. Now is an excellent time to make improvements, and may we hope that such improvements will be made in the training of young engineers as a result of careful analysis.

## Soap in Peace and War

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### SYNTHETIC RUBBER CALLS FOR SOAP

More surprising, perhaps, than many other industrial uses, is soap's important role in the production of synthetic rubber. About one hundred million pounds of soap is going annually into this process. During the polymerization process, soap is added to the butadiene and styrene as an emulsifying agent. For example, it takes about 31 pounds of soap to produce the tires for an Army truck, and 100 pounds of soap for the synthetic rubber in a medium tank.

Later on when the finished rubber is ready for molding into tires or other articles, soap still takes a part, this time as a mold lubricant. It is especially fitted for this job because it does not break down at the high temperatures of the process. So in every new or recapped tire, soap has had a role in one form or another.

### GLYCERINE—1001 USES

The story of soap cannot be fully told without devoting a generous share of attention to glycerine. Always important for its manifold uses in industry, food, and medicine, glycerine became a vital product in wartime. As a primary ingredient of war's high explosives, glyc-