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# *Dynamic Objectives - II*
# *The Importance of Design*

Readers of this journal are again encouraged to study the excellent report "Dynamic Objectives for Chemical Engineering." It is a document worthy of careful examination and frequent reexamination, since it is unusually imaginative, sound, and thought provoking.

One particularly acute part of this report is devoted to chemical engineering education. The emphasis that the report places on chemistry was discussed on this page in the last issue. Another point in the report, even though rather more stress is put on engineering science than on design, is the concern of the committee for the subject of design.

A course in process design at the undergraduate level is a particularly powerful device for instilling maturity and broad comprehension in the student. Here he is required to utilize all the knowledge and skills he has acquired in his whole college career. Such a course can be superb in developing initiative in the student. In the vast majority of college courses the student must follow the lead of the instructor, and nowhere is this more evident than in conventional problem assignments, most of which have been predigested by the instructor. In process design courses, however, the individual is required to formulate the problem, to pursue his own ideas, and to develop responsibility for his own work.

The concept of design gives one of the most powerful *raisons d'etre* for engineering science. Engineering science, like any branch of science, is most concerned with pure curiosity and pure inquiry, but engineering science differs from other, pure sciences in that it is not usually at the frontiers of knowledge. It must, therefore, put some emphasis on utility, and such utility is again largely in the field of design. It was the attempt at rational design of catalytic converters which led to much fine and continuing scientific work in the measurement of transport properties in beds of solid particles. It was the attempt at better design of separation devices such as distilling columns and absorption towers which led to the excellent advanced scientific work in phase equilibrium and applied thermodynamics. When we attempt to design a new process or plant, our ignorance is brought forcibly to our attention. Probably many undergraduate students have thus been made aware of the great need for further studies of an engineering scientific nature, studies which they may well pursue in graduate work.

Design, after all, is the essence of engineering, involving a high degree of intellectual attainment. It requires patient and thorough analysis, and it rewards inventive and imaginative synthesis. The design function constitutes the primary distinction between the scientist and the engineer. Some experience with this fascinating and rewarding subject is essential in any undergraduate chemical engineering program.

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