

WHAT PURPOSE AGRICULTURAL ENGINEERING

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The word engineering has gone through an evolution or change in definition and meaning which makes it difficult to establish a purpose for engineering which would be satisfactory under all usage. While engineering was originally defined as the art of constructing and managing engines and machines, today it is more generally considered as the application of Science. Therefore as a first step in establishing a purpose for Agricultural Engineering it is necessary to define engineering in three forms as used in the present day.

1. Engineering is the *Profession* in which a knowledge of the mathematical and physical sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically, materials and forces of nature for the progressive well being of mankind.

2. Engineering is a type of *Institution or Department* in which a knowledge of the application of the mathematical and physical science gained by study and experience is taught or practised with judgment and intent to develop ways to utilize, economically, materials and forces of nature for the progressive well being of mankind.

3. Engineering is the application of *techniques or practices* developed from a knowledge of the mathematical and physical sciences to develop or utilize materials and forces of nature.

Some elaboration of the wording will perhaps help to give understanding to the meaning.

(1) Engineering is defined as a *profession* implying that it ranks with other so-called learned groups in present society such as medicine and law.

(2) The idea of *knowledge* is included and emphasized because it is felt that it is knowledge that distinguishes a profession and that it is knowledge which the professional applies in the accomplishment of his objective. The scope of the knowledge considered peculiar to engineering has been limited to the realm of the mathematical and physical sciences to distinguish it from medical or social sciences. The physical sciences include such items as chemistry, physics, electricity, mechanics of solids, thermodynamics, fluid mechanics, etc.

(3) *Study, experience, and practice* are enumerated because these are the

items by which an engineer is judged and which he must, in fact, prove if he is to be accepted as a professional by any legal jurisdiction.

(4) The idea of *judgement* is included as well as the subject of economics as both are considered important phases of engineering activity. Whether or not a matter is economical or practical is usually a matter of judgement. In addition, many engineering decisions are made in areas not subject to specific and accurate analysis.

(5) The words "to utilize economically the materials and forces of nature for the progressive well being of mankind" are intended to convey, first that economics is a primary consideration in all engineering, and second, that the engineer's tools are the resources of nature and his aim is to improve human welfare.

(6) It is implied that an engineering *institute* or an engineering *department* is made up of people applying their knowledge of mathematical and physical sciences either by interpretation to others or in actual practice.

(7) It should also be pointed out that engineering as an *operation* is merely a means to an end and that it is the person carrying out the operation that gives the ultimate purpose to engineering.

Although emphasis is placed on the person doing engineering it is not intended, at this time, to elaborate on requirements or qualifications except to point out that to be an engineer a man must have a predetermined minimum knowledge of the mathematical and physical sciences gained by study, experience, and practice in order to be considered eligible to apply this acquired knowledge with judgment to develop ways to utilize economically materials and forces of nature for the progressive well being of mankind. In other words, he must have a certain amount of knowledge and an understanding of the purpose for the application of the knowledge. These minimum standards and criteria are set by and are the responsibility of Universities and registering Associations of Engineers. The University setting the requirement for the knowledge aspect and the Associations of Engineers for the experience and practice.

By affixing an objective adjective to the word engineering, the scope of the application of the knowledge of the mathematical and physical sciences is defined. In this case agricultural engineering limits "the materials and forces of nature" to include those which are directly or indirectly a part of the total agricultural production and industry field. This includes the production, processing, transportation and utilization of its produce and by-products; the efficient utilization and conservation of its natural resources and the requirements of related industries and services.

The problem in agricultural production are usually complex and in total require many basically inherent phases of a number of disciplines of engineering. It has become accepted therefore, that agricultural engineering in its broad field of operation is comprised of four rather clearly defined areas.

1. Farm Power and Machinery

The purpose of engineering in the farm power and machinery field might well be described as the application of knowledge of mathematical and physical sciences, to develop ways to utilize economically the energy sources of nature for agricultural production. This includes what is commonly accepted as investigation into methods of utilizing present sources of energy as well as developing new sources of energy, the design of equipment which utilizes energy and the insuring of efficient operation of power units and equipment.

2. Farm Structures

In the farm structures area, engineering is the investigation and development of ways to utilize materials and forces of nature for functional and efficient buildings. This is meant to include design, techniques of fabrication, labour saving arrangements, and new material uses to permit economical cost, efficient utilization of labour, satisfactory sanitation, comfort, and condition for the housing of livestock or the storing of agricultural products or by-products.

2. Electric Power and Processing

The electric power and processing area requires engineering to investigate or to develop ways to utilize materials and forces of nature for the production, control, and processing

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