Timelines

in the Development of

Agricultural and

Biological Engineering

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Preface

Twenty outstanding engineering developments of the last century were identified by the National Academy of Engineering (NAE) and published in *Greatest Engineering Achievements of the 20th Century*. Three of the twenty outstanding engineering achievements closely related to agricultural engineering are:

- Electrification
- Agricultural mechanization
- Household appliances

Several members of the NAE Special Fields category (Section 12), which includes agricultural engineering among other fields, met as an ad hoc group in 2008 to recognize two of its members who participated in the identification of the twenty major accomplishments: Dr. William E. Splinter and Dr. Essex E. Finney. The meeting of the ad hoc group, chaired by Dr. William J. Chancellor (based on the suggestion of J. K. Wang), came shortly after the release of the *Greatest Engineering Achievements of the 20th Century* book by NAE and after the 100th anniversary of the American Society of Agricultural and Biological Engineers (ASABE), the professional organization most closely related to the twenty outstanding achievements. ASABE is recognized as the professional engineering society for agricultural and biological engineering—for the application of engineering practice to biological products (plants, animals, fish, and forests, except medicine).

Many individuals functioning in various fields of endeavor in several countries over more than 100 years developed the machines, implements, apparatus, and processes that were significant and adapted to or applicable to agricultural and biological engineering. An outgrowth of the ad hoc group discussion was a compilation of these developments according to dates, person(s), company, and organizations credited, as cited in the literature. Where available the dates of birth and death of the persons involved were included.

I compiled the information related to timelines and this is the resulting manuscript. The emphasis is on those subjects developed or influential in the USA and Canada. Discoveries and inventions in other parts of the world that were influential or formed the basis of developments are also described. Subjects are listed by dates and briefly described, based on references, according to the following categories:

- Agricultural tractors and power units
- Agricultural field implements, related apparatus, and equipment
- Electrification, farmstead, and processing equipment
- Home and household items
- Organizations and related topics

The literature references are identified by letters taken from their titles and are listed at the end of this manuscript.

Discrepancies were found among the references in that it was often not clear whether

a date referred to an idea, model, patent, publication, or product introduction. The date of recognition of an invention was often not accompanied by a patent. Some inventors believed that findings should be available to the public and did not patent their developments. Others received patents in anticipation of a product that did not follow. In the early years of slow communications, an invention might be claimed by a patent while a similar invention was also claimed in another country. A citizen of one country might get a patent in another country. It was not unusual for a product or process to appear before or after a patent was issued, and this was not clearly identified in the literature cited.

It is hoped that this document will help place in perspective the development and growth of agricultural and biological engineering, including those developments that occurred before the 20th century. There was considerable discussion throughout the 20th century about the importance of the biological aspects of the profession of agricultural engineering, but the earliest simple phrase was to identify the thrust as the “engineering of biology for agriculture,” in 1937. The increasing importance of biology continued and was incorporated in the name and structure of ASABE in the beginning of the 21st century, as well as in the names of many academic departments. Other organizations, including ABET, the accrediting organization for engineering programs, recognize ASABE for its emphasis on biological engineering.

The developments have moved from mechanical, electrical, and electronic to include biological and chemical components, depending greatly on development of materials and computer capabilities. These developments are illustrated in the dates, entries, and references. ASABE has moved to recognize the increasing importance of biology in its programs.

In spite of the efforts of the author and the input of reviewers, important milestones have undoubtedly been overlooked. Several suggestions of items to be listed were received, but in some cases I was not able to identify the responsible agent or the appropriate date for their introduction. Some recent developments haven’t made the history they deserve but will be recognized as important in future years. Many innovations now unknown or not publicized will be even more impressive and voluminous as the innovative spirit is incorporated in current education and research in industry, education, and government.

Carl W. Hall
January 1, 2011

Abbreviations

AMS	Agricultural Marketing Service (USDA)
ARS	Agricultural Research Service (USDA)
ASAE	American Society of Agricultural Engineers
ASABE	American Society of Agricultural and Biological Engineers
bhp	belt horsepower
CSAE	Canadian Society of Agricultural Engineers
c.	circa, about, approximate
dhp	drawbar horsepower
DOD	Department of Defense (USA)
DOE	Department of Energy
est.	estimate
ff.	and following (usually used after dates)
fl.	date flourished (used when dates of birth/death not located
GPS	Global Positioning System
hp	horsepower
IHC	International Harvester Co. (or Corporation)
LPG	liquefied petroleum gas
mbhp	maximum belt horsepower
NTT	Nebraska Tractor Test (usually followed by the number of the test)
NTTL	Nebraska Tractor Testing Laboratory
OECD	Organization of Economic Cooperation and Development
OSHA	Occupational Safety and Health Administration (USA)
pat.	patent, patented
PTO	power take-off
ROPS	roll-over protective structure
SAE	Society of Automotive Engineers
SCS	Soil Conservation Service (USA)
USDA	United States Department of Agriculture