



SAIAE News Bulletin

South African Institute of Agricultural Engineers August 2006



From the Council

In this issue we have from the Council, Prof. Jeff Smithers an international perspective of the name 'Agricultural Engineering'. There are many definitions, but does the general public really know what Agricultural Engineers do? Prof Smithers also discusses the names of Agricultural Engineering societies as well as Academic Departments in the USA. The summary of the names of Agricultural and Biological Engineering Programs in the USA is comprehensive and Prof. Smithers concludes with some interesting thoughts on the subject.

Commercial or on-farm biodiesel plants – this is the question Adriaan Louw and Frans Hugo explain in their article on this significant matter. The economy as well as the quality control involved are discussed. With the SABS having drawn up standards, funds were made available for a laboratory but personnel must still be trained.

News from CIGR is that the 3rd ISMAB will be held in Korea on 23-25 November this year. Read through the subjects for the papers and posters, and there just might be a topic you'll be interested in!

Editor

What is happening to the name of “Agricultural Engineering”: An international perspective

Professor Jeff Smithers

School of Bioresources Engineering and
Environmental Hydrology
University of KwaZulu-Natal

What is Agricultural Engineering about?

One of the problems facing Agricultural Engineering, both in South Africa and internationally, is that the general public, prospective clients and potential students have either not heard of Agricultural Engineering or do not know what Agricultural Engineers do. A broad definition for engineers is that they identify peoples' needs and use innovation, ingenuity, science and technology to provide optimum solutions for these needs. So what do Agricultural Engineers actually do?

Many definitions for Agricultural Engineering exist. The International Commission of Agricultural Engineering (CIGR) use the definition “Agricultural Engineering is the application of science and technology in agriculture, food and biological systems, for the benefit of humans” and according to the American Society of Agricultural and Biological Engineers (ASABE) “Agricultural, Food and

Biological Engineers develop efficient and environmentally sensitive methods of producing food, fiber, timber, and renewable energy sources for an ever-increasing world population". In South Africa, the School of Bioresources Engineering and Environmental Hydrology (BEEH) at the University of KwaZulu-Natal frequently use the slogan "Engineering in and with the Environment". These definitions highlight that Agricultural Engineers have a unique understanding of the interrelationships between technology and living systems i.e. they connect the living world of plants, soil, water & animals with the technology of engineering and they "engineer for life"! So how can we capture the above in a descriptive name which indicates our core business and skills?

Names of Agricultural Engineering Societies

Many agricultural engineering societies around the world retain "Agricultural Engineering" in their names. These include the International Commission of Agricultural Engineering (CIGR, Commission Internationale du Génie Rural), the European Society of Agricultural Engineers, the Society for Engineers in Agriculture (Australia) and in many societies in Africa. In Canada the name "Canadian Society for Bioengineering" is used to describe the society for "engineering in agricultural, food, environmental, and biological systems". In 2005 the "American Society of Agricultural Engineers" (ASAE) changed the name of the society to the "American Society of Agricultural and Biological Engineers" (ASABE), which currently has approximately 9000 members from over 100 countries.

The motivation for the change in name to ASABE was to "better represent the breadth and depth of the profession". China is currently producing four times the number of agricultural and biological engineers compared to the United States, with more than 70 universities which have Agricultural Engineering colleges or departments. In 2002, the Agricultural Engineering Society in China was renamed the "Agricultural and Biosystems Engineering" forum. A factor which influenced the renaming was what was happening elsewhere in the world regarding Agricultural Engineering.

Names of Academic Departments in the USA

A summary of the names used by academic departments in the USA which offer degrees in agricultural engineering is contained in Table 1. None of the 40 departments surveyed currently retains only the name "Agricultural Engineering". The most popular combinations of names are "Agricultural and Biological Engineering" (7) and "Biological and Agricultural Engineering" (7), followed by "Biosystems and Agricultural Engineering" (4) and "Biological Systems" (4). Twenty-four departments retain the name "Agricultural" in the name of the department while 26 and 25 departments utilise the prefix "Bio-" in the first and second name respectively. Clearly there has been a strong driving force to make the name more descriptive and to emphasis the "Bio" fields.

CPD EVENT!

When: 10-12 October 2006
Where: ARC Central Office, Hatfield, Pretoria
RSVP: 29 September 2006
ReindersR@arc.agric.za

Table 1. Summary of the names of Agricultural and Biological Engineering Programs in the USA

(Program name = “First Name” and “Second Name” Engineering)

First Name	Second Name													Total
	Agricultural	Agricultural Systems	Biosystems	Bioresource	Biological	Biological Systems	Bioengineering	Bioenvironmental	Biosystems	Chemical	Environmental	Food, Agricultural	Irrigation	
Agricultural			3		7				2					12
Agricultural Systems														0
Biosystems	4		1											5
Bioresource	1			1										2
Biological	7	1			2						1		1	12
Biological Systems						4								4
Bioengineering							1							1
Bioenvironmental								1						1
Biosystems									1					1
Chemical					1									1
Environmental														0
Food, Agricultural					1									1
Irrigation														0
Total	12	1	4	1	11	4	1	1	3	0	1	0	1	40

Concluding Thoughts

Many of the international societies for agricultural engineers in the world retain “Agricultural Engineering” exclusively in their names. However, it is interesting to note that, of the societies surveyed, the societies in the USA and China, which are probably the largest groupings of agricultural engineers, have added the words “Biological” and “Biosystems” to their respective names. A similar trend is clearly evident in the names of the academic departments in the USA which offer degrees in Agricultural Engineering. Should we be considering a similar move by SAIAE? Such a change could increase the breadth and depth of the profession, correct a perception of where Agricultural Engineers currently find employment, follow international trends, and also has advantages from a marketing perspective.

The increasing demand for agricultural products, the need for more efficient and sustainable agricultural production both to feed the population and as a potential source of energy, the increasing emphasis on the conservation of soil and water, the application of the advances in knowledge brought about by information and bio-technology in agriculture and environment management, and meeting environmental regulations, all point to a growing need for Bioresources Engineers.

Whatever they are called, Bioresources Engineers have a unique understanding of the interrelationships between technology and living systems and have the necessary blend of skills to meet the technological requirements for sustainable environmental management and food production and processing.

Send us your opinion to reindersr@arc.agic.za

Commercial or on-farm biodiesel plants – which one?

Adriaan Louw Pr Eng and Frans Hugo Pr Eng

Biofuels, or bio-ethanol and biodiesel have lately come to the attention of everyone with the excessive rise in fuel prices, which is heavy on everyone's pocket. The possibility of biofuels is seized by many a farmer as a relief from rising fuel prices and, in the case of bio-ethanol, as a market for surplus maize. GrainSA has also negotiated for tax exemption for farmers who manufacture their own fuel.

These days, the Internet makes it very easy to obtain general information and recipes for the manufacture of biodiesel. This creates the ideal opportunity for every DIY-person to make a plan or to purchase a small plant from one of the many new suppliers of equipment, who have also recognized this new opportunity. It now only needs a few calculations on the back of a cigarette pack and lo and behold, the small plant is erected. Used cooking oil as resource for the biodiesel and the chemicals are purchased and the fuel is made according to the recipe. After about two months after starting manufacturing, the vehicle is using your own fuel.

What a wonderful new opportunity and independent future!

But is it really that simple?

The economy

The price and availability of the raw materials and the available markets and price of the by-products are of cardinal importance in the economic feasibility of a biofuel plant. If a farmer can receive R2 000 per ton for his sunflowers, the oil thereof already costs R5 per litre. With a good oilcake price he can get back R1.00 per litre from the sale of the oilcake. It is however not everyone who gets a good price for the oilcake. The quality of the oilcake depends on the quality of the pressing process. The process costs, namely electricity costs, chemicals, supervision, capital, interest etc,

must also be taken into account.

The question must be asked if the possible saving is really worth it for the farmer to spend his attention on the specialised manufacturing process in addition to his farming practices.

The plant

With larger plants, the following is especially applicable regarding cost implications that is not considered in all plants

- An environmental impact assessment study must be done.
- The plant must comply with the requirements for a petrochemical industry.
- The requirements of the Act on Occupational Health and Safety must be complied with.

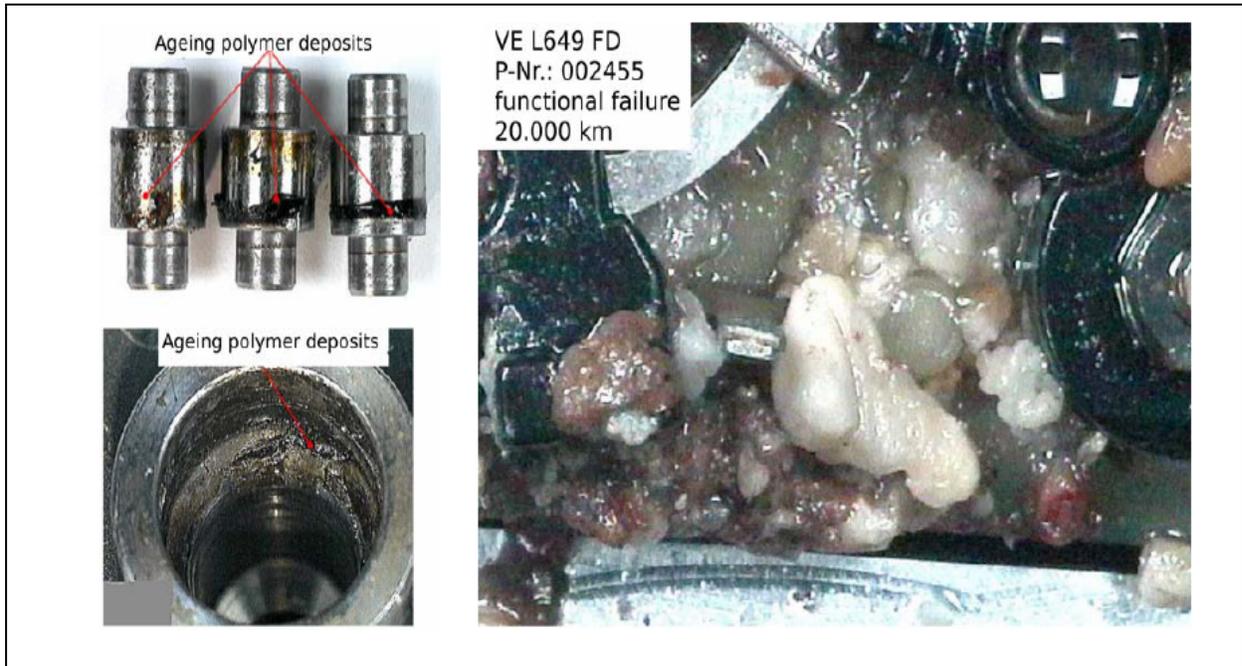
How many farmers will comply with all these legal requirements

Quality control

Engine and injection problems do not necessarily occur overnight. They come about over a long period. Some engines with indirect injection systems will

probably experience fewer problems than direct injection engines.

The following figures show damage to injection pumps from long-term effects of poor quality biodiesel. (Source: Robert Bosch GmbH)



Whether the fuel is for own use or sold, the fuel must first comply with certain standards to be acceptable for blending by fuel companies and to prevent engine damage over the long term. The Petroleum Products Act must also be noted. It stipulates that where fuel is manufactured or sold, a licence for the manufacturing must be obtained. The distributor of the fuel must also have a licence. The condition for retaining the licence is that fuel must be manufactured according to the necessary standards.

If the fuel is for own use, the farmer can of course take a chance, knowing that the guarantee on his engine will no longer apply. If the fuel is sold or if someone acts in an advisory capacity with the manufacturing of fuel and engine damage occurs, large claims can be expected.

Tractor manufacturers have already indicated that problems with the use of poor quality biodiesel have been experienced.

The quality of the end product is already determined by the quality of the primary raw product, namely the seed. The better the quality of the seed the better the end product will be. With the use of old cooking oil, quality control becomes even more difficult. Using titration techniques can help to determine the amount of catalyst but does not ensure the quality of the end product. To maintain a high quality, the final product must be analysed on a daily basis, which requires a well-equipped, expensive laboratory, manned by a professional chemist.

The SABS has already drawn up standards for biodiesel, based on the European Commission's standards. Funds were made available to the SABS to establish a laboratory for testing biodiesel. The necessary personnel must also first be trained. In the meantime, the samples must be sent abroad for analysis at ± R16 000.

Fuel manufacturing is a specialised field where quality control is essential and it will not easily be done in small plants.

Unfortunately many in the biodiesel industry will still have much school fees to pay

Biofuels however pose the greatest potential for the farmers to produce for an industrial biofuels market with a bottomless pit. The manufacture will however only be done by commercial or cooperative plants that possess the technical capacity to ensure quality.

.....

3rd ISMAB

The 3rd International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering (ISMAB) will be held at COEX in **Seoul, Korea on 23-25 November 2006**. This time, the biennial symposium is organized by the Korean Society for Agricultural Machinery and co-sponsored by the Japanese Institute of Agricultural Machinery.

Papers for either oral or poster presentations are called for the following subjects:

- Agricultural informations
- Bioenergy and alternative energy
- Biological engineering
- Biomechatronics
- Farm power and machinery
- Food engineering
- Postharvest technology
- Precision farming
- Sensor technology
- Structure and environmental technology
- Robotics in agriculture
- Others

The official language of the 3rd ISMAB will be English.
E-mail: chchoi@skku.ac.kr