


SAIAE News-letter

South African Institute of Agricultural Engineers **March 2008**

EDITOR'S NOTE

Welcome to this first issue for 2008. We hope that everybody has arrived safely at home after the holidays and it is already clear that everybody is geared for the coming year.

President Neels Bezuidenhout explains the five strategies which form part of the strategic plan and it shows that 2008 will be filled with new actions to be taken.

There is an employment opportunity for a SAIAE National Business Manager. Please note the requirements and if interested, don't hesitate to contact Felix Reinders ASAP.

Greg Diana's article adresses the choices on the selection of standby generators in the series 10 - 200 kVa.

Read about the most important aspects of mechanisation planning with the evaluation and comparison of two farmers: Farmer A and farmer B. (The '?' in some of the tables should be 'l' for 'liter' - technology mishaps!...)

A student tells us about his positive experiences with his vacation work.

Please note the date for the next CPD meeting as arranged by the KZN branch.

In his most interesting article we get a bird's eye view on the new Branch Chairman of KZN - David Clark.

Editor: D. vd. Merwe

From the table of the President

Neels Bezuidenhout

Feedback of the SAIAE Council – Strategies for

SAIAE's existence depends, among others, on the input that its members give and on its exposure to the market. The SAIAE Council created various opportunities and methods during the past few years to enable members to promote communication in both directions. We would again like to call upon our members to communicate with us regarding success stories that we can publish and thereby keeping our members informed and at the same time offer a marketing opportunity.

The five strategies that from part of our strategic plan are discussed briefly below:

Strategy 1 - Trademark establishment and positioning of the career in the market

We created various opportunities during the past few years where Agricultural Engineers and technicians can give their inputs and market their success stories. We need continuous information from our members to place articles on the website and in the LandbouWeekblad and other magazines. We have an agreement with the LandbouWeekblad to place articles from SAIAE members free of charge, while we carry the annual cost of radio talks on Radio Sonder Grense (RSG) once per month.

The University of KwaZulu-Natal is also in the process of compiling a DVD and radio talks that we would like to use in marketing to recruit prospective students. We are also in the process of compiling a generic radio advert to give our profession more exposure.

In the process, we however need the assistance of our members to inundate us with subjects and success stories that we can use and thereby also keep our website continuously alive. We especially need our members to be involved in this regard. This will not only help with the exposure of our field of study, but the activities of the members can be introduced free to the public. Please make use of this opportunity.

Strategy 2 – SAIAE Representation

SAIAE is constantly represented by instances such as ECSA, SANCID, SAII, ICID NSTF and SETAG and our website is connected to some of these institutions, which gives us more exposure.

Strategy 3 – Continued Professional Development (CPD)

In 2007 we concentrated on bringing the CPD event closer to our members by means of single-day events throughout South Africa. Some similar one-day events will also take place during 2008, but the main CPD event for 2008 will again be a multi-day occasion (previously known as symposium), where we will endeavour to enable our members to gain sufficient CPD-points for ECSA-registration purposes in a single trip, within a short time-span. Much attention is being given to obtain top presenters and subjects. Members are welcome to send in any specific subject they wish to present. See the article on CPD in this newsletter.

We will be connecting our website to that of other institute's websites for CPD events of importance that our members can attend.

Strategy 4 – Recruitment of new students and support to students

We are constantly searching for bursaries and holiday employment for our students and we would like to call on any of our members who can be of assistance in this regard, whether doing it by yourself, or recommending someone to contact. We have also decided to make limited loans available on merit to students in financial need. The students will go through a strict selection process for approval. Current support to students in the form of prizes and transport subsidies to get them to branch meetings will be continued in 2008.

With the increasing demand for bio-energy, the opportunities and needs for our field of study will in future become greater and it is therefor necessary to especially give attention to the recruitment of new students. There is especially a shortage of Afrikaans-speaking students.

Strategy 5 – Communication with and support to members

The SAIAE Council has decided to employ a business manager on a salary to assist the Council in the execution of their strategies. With this appointment, we plan to promote communication with our members and promote more execution to cardinal actions in our strategic planning. It will supply an updated service to members and represent SAIAE in the open market to ensure the continued existence of our field of study.

Branch meetings and Newsletters are top of the priority list of actions. The SAIAE membership database was updated during the first two weeks of January.

2008 promises to be a year full of action.

Employment Opportunity

SAIAE National Business Manager
(part time employment)

The South African Institute of Agricultural Engineers (SAIAE) represents the profession and promotes Agricultural Engineering in South Africa. The SAIAE is seeking to employ an articulate, dynamic, self-motivated and well organized individual to support and implement SAIAE strategic goals, council directives and Continuous Professional Development (CPD) activities in order to better serve members and grow the institute. The minimum requirements for the position are:

- Evidence of strong administrative skills
- Evidence of office/project management
- Tertiary education, with at least 3 years of work experience
- Previous business management experience
- Evidence of ability to work independently with limited supervision
- Proficiency in MS-Office software

Added advantages include:
- Experience in Engineering and/or Agriculture
- Experience in marketing
- Experience in financial management

While the ideal location for the incumbent would be near to Pretoria, applicants from other regions in South Africa will be considered. Further information on the SAIAE can be obtained at www.saili.co.za.

The position is part time for approximately 3 mornings per week. The salary is negotiable, depending on skills and experience, but will be in the range of R50 000 to R70 000 p.a. plus approved expenses. To apply, send a letter of interest outlining your match to the minimum selection criteria, your CV, and names and contact details of three references to Mr Felix Reinders, Secretary, South African Institute of Agricultural Engineers, P O Box 912719, Silverton 0127. The review of applications will commence on 01 April, 2008 and will continue until the position is filled. Previously disadvantaged individuals and persons from under-represented groups are encouraged to apply.

A SHORT NOTE ON THE SELECTION OF STANDBY GENERATORS

Greg Diana, Senior Lecturer, School of Electrical, Electronic and Computer Engineering
University of KwaZulu-Natal

Introduction

This article briefly describes factors that should be considered when deciding to opt for standby generator plants in the region 10-200 kVA. This is becoming of growing importance now that there are clear indications of insufficient generation capacity for some years to come. The article highlights some the important factors when considering such a contingency using layman's terms.

Background

Given the uncertainty as to when South Africa will restore its generation capacity to avoid load shedding activities and bearing in mind the risk to ones business activities it is inevitable that one considers contingencies to avoid such an eventuality and its consequences.

It is natural when one experiences load shedding to simply try and remove the problem. Unfortunately having grown too accustomed to the luxury of excess generation capacity it has become a thoughtless commodity that we are simply billed for at the end of the month. As such one tends to overlook important factors, which are largely hidden, but which come to the fore when operating off isolated standby plant.

Initially the tendency is to opt for a standby generator to cure such ills and the focus is on what size, fuel source, how expensive and when may it be delivered. Then when confronted by 10 different standby generator suppliers each with their own marketing angle it tends to become a supply and demand issue causing one to lose focus on the prime issues that will rear their head if not given careful forethought.

First things first

The first thing that one has to consider is factors of safety and compliance. Regardless of whether one has a household, small holding or large farming operation all electrical equipment is designed to guarantee operation within specified tolerances or quality of supply. ESKOM or any municipality is required to supply electricity within specified tolerances so as to guarantee the operation of all electrical equipment and appliances. Failure to do will result in either under performance, failure or damage to equipment. Hence any standby generation must therefore also guarantee operation within the specified equipment tolerances.

Examples of this are that all electrical equipment only guarantees operation within a ±5% variation of the supply voltage and ±1% variation in frequency. Thus if one has equipment rated at either 220^{v}, 230^{v,} 250^{v}, 380^{v}, 400^{v} or 500^{v} then any standby generator must guarantee operation within this band. If for example one is using standby generators to supply electric motors then excessive under voltage will cause motors to rapidly overheat as they will draw excessive current to generate sufficient electrical torque to drive the mechanical load. Given that electrical motors generate torque as the square of the supply voltage (Torque~V^2) one can see that low voltage can create problems. The case of motors running at higher than normal voltages is not as problematic as it will draw less current and produce less heating.

Thus in short the most critical aspect of any standby generator is to be able to replicate the tolerances within which ESKOM guarantee its supply (when available!) and which then defines the operation of the standby generator.
Hence the first question that must be asked is "can your standby generator guarantee rated voltage and rated frequency within ±5% and ±1% respectively under all modes of operation". Please note that when using your own standby generator the engine will speed-up and slow down when removing and adding load respectively. This will cause the voltage and frequency to undershoot and overshoot its nominal or rated values of voltage and frequency (220^{V} ±11^{V}, 50Hz ±1Hz).

Having said this what does this all then mean? Simply put it means that any standby generator must be provided with both accurate and fast acting speed and voltage regulators. The speed regulator is required to maintain the engine speed and hence frequency of the electrical supply constant and the voltage regulator is required to maintain the magnitude of the supply voltage constant. Generally a mechanical speed regulator or governor is slow acting and when either loaded or unloaded will take several seconds (1-8 sec) to return to its set speed (just like we experience with the speedo-cruise in our cars) whereas the voltage regulator is far quicker taking some 50-200 milliseconds to do same. These might sound too technical but is what lies at the heart of a successful standby solution
Another important aspect is the quality of the electrical waveform produced. Most electrical equipment and particularly motors require a sinusoidal waveform over and above the magnitude and frequency tolerances mentioned above. Any continued deviation from a sinusoidal waveform will lead to mal-operation or overheating and in the case of a three phase supply any imbalance will do same.

Lastly and not too obvious is the issue of safety. When one runs one's own standby generator one does not have the downstream electrical protection that either ESKOM or the municipality supplies. Hence any faults experienced by the standby generator will have to be "cleared" by your own protection, failing which the system will simply stall creating your very own load shed or blackout! As mentioned if the speed and voltage regulator are too slow then this may impact on the protection and create spurious tripping akin to self imposed load shedding. This protection might be at the standby generator itself or remotely at the appliance, equipment or plant being supplied.

To summarize then the following should be noted;

- Magnitude of Voltage variation – rated ±5% (within 0.5 second)
- Magnitude of Frequency variation – 50 Hz ±1% (within 5 seconds)
- Waveform quality < 2% sinusoidal with < 2% imbalance for three phase.
- Rather run at slight higher than lower voltage.
- Check speed regulator droop from no-load to full load.
- What protection is provided, how and who sets it and how reliable is this.

Note and take care of these issues as if and when an insurance claim is necessary all these factors will be considered.

<u>Down to Business</u>

Having an idea of the essential criteria it is now down to the business end of shopping for the best solution. You may be assured

that if any service provider is able to guarantee all of the above (and more) that you are on the right track. If this sounds like Greek to them then I suggest walk away.
The sizing and selection of any standby generator are quite straight forward issues as one would presume that an existing house, factory workshop etc already has a distribution board or distribution panel with main circuit breakers which have the rated amperage written on them.

For example if your main circuit breaker for your house or pole fuse is rated at 80 amps then this should suffice plus an additional 20% say 100 amps. If your supply voltage is single phase 220^v then the rating of the standby generator should be 220X100 = 22 kVA. If one has a 400^v three-phase supply then it should be 1.73X400X100 = 70 kVA.
Bear in mind that standby generator units do not come in every size and 5, 10, 15, 22, 33, 44, 66, 88, 110, 165,220, 275, 300, 330, 375, 400, 410, 440 and 500 kVA are typical ratings that are commonly available and as one can see the options become limited as the unit rating increases. It is found that single phase systems generally go up to ~ 30kVA. Above this they become specialized and expensive and some suppliers simply adapt three phase systems. Always try and buy "standard" equipment whether new or second hand.

Another example is say one has several facilities each with its own main distribution board all operating at the same voltage levels. Then one simply sums the individual main circuit breaker ratings together add 10% and multiply by the rated voltage. Hence if we have 40A, 100A and 80A we have 220X1.1 ~ 250A or 250X220 = 55 kVA. If one has independent systems far apart one may have distributed generation consisting of multiple units each with its own rating and voltage. Thus a house might be 20 kVA 220^v single phase with a remote pump at 100 kVA, 400^v three phase and so on.
This method simply allows one to determine the static rating but a more important consideration is the dynamic rating. The static rating is the rating required once the system is running at constant speed with a constant load. However, what happens if the generator set is suddenly loaded by the starting of a motor or a pump takes additional load then one will require a significantly larger amount of power in order to recover and keep the speed, voltage and frequency within the specified tolerances. Static rating is much like holding a weight in your hand with your arm outstretched and horizontal as opposed to maintaining your arm outstretched in a horizontal position and trying to catch and hold a weight which falls into your hand, without moving your arm. The dynamic rating may significantly increase the overall rating depending on the largest load that one expects to either come onto or drop off the system.

Hence one might have static rating of 44 kVA but due to a load of 20 kVA being imposed on the system and being removed at a regular interval the dynamic rating might have to be doubled to 88 kVA to account for this and allow the engine to recover sufficiently quickly and remain within the specified tolerances. In some instances some units employ a smaller unit equipped with a flywheel which serves to utilize the kinetic energy stored in the flywheel to do same; however in such cases the units will take some time to get up to speed from a standing start. A case of "horses for courses".

It is not generally known that any standby unit is unable to suddenly take on full load. After a loss of supply the unit will either be manually started or start automatically. Once it has run up to speed and has settled down providing the correct voltage and frequency it is ready to be loaded. Generally most standard units may be loaded in incremental steps of ~25% full load.

In such a case one might have to design a digital controller to bring load on line in an incremental fashion or else run the risk of stalling the engine. In many instances one thinks of the system being "self-starting", but very few consider what happens if the systems stalls! In most cases people now have to go outside and manually restart each system and to overcome this one should also consider auto-reclosing. Many remote farms already have this, where the system trips due to lightning or some fault and the system is automatically reclosed trying to reestablish the supply stopping after three or four unsuccessful attempts. ESKOM use this to prevent having to send technicians considerable distances just to reset a switch! In farms or remote areas this might be an important safety consideration.

One may also consider running multiple smaller units rather than a single large unit which might be an even better strategic solution. Thus one could have say four units and keep one spare, so that one could allow for maintenance and repairs to any one unit. Such a system will require either an additional synchronization panel or the individual units must be capable of being synchronized to one another. When running multiple synchronized units special equipment is required to ensure that all units run at the same voltage, frequency, phase and phase sequence prior to synchronization.

Another critical issue with three phase systems is the phase sequence. Normally three phase systems have four wires namely three phases and a neutral commonly labeled as A,B,C,N or U,V,W,N or R,S,T,N depending upon country of origin. For three phase systems which use electric motors the phase sequence in which the motor is connected determines the direction of rotation. Hence, one may be connected to the ESKOM supply whose phase sequence is ABC and upon load shedding the generator provides ACB which will cause all motors to run "backwards" having severe consequences. One must ensure during commissioning that the phase sequence is correctly determined to avoid any mishap. It is normal that upon being load shed the standby units "kick in" within 3-5 secs in which case large motors might be still running down and if suddenly supplied with reverse phase sequence, large currents may be drawn, causing the system to stall and even damaging the shaft of the motor if connected to a pump, fan or non-reversible mechanical load.

However, a big assumption is that it is business as normal! By this it is meant it has been assumed that if one is load shed one sizes the standby unit for continuing as normal. In practice this might not be the case as it costs about 7-8 times more to operate compared to ESKOM. In such cases one would therefore have to consider running at reduced operations to lower the load and the running costs. Hence if it cost R1000 from ESKOM it will cost ~R7000 to operate your own system. This excludes having to go and buy and store fuel. Hence the decision to opt for standby plant requires a holistic approach.

If one wishes to store more than

1000 litres of fuel then by law an environmental impact assessment (EIA) is required.

If you speak to any suppliers of late they will probably tell you they have spent more time learning, educating and "putting out fires" due to people rushing to buy any available solution. Note that when one buys a standby system one is buying a combination of an engine and a generator both of which may be from different suppliers being imported and assembled by a local distributer and then sold by a local representative / supplier and possibly maintained by a third party. These are all questions which have to be asked AND ANSWERED. To protect yourself ensure that you seek professional assistance to develop a technical conformance and payment specification. When the system is commissioned these performance specifications will have to be conformed to as a condition for payment.
All the above is applicable to a system of any size. It must be noted that these factors should be used as a guide to selecting a unit and to ensure that the solution being proposed by a service provider is workable. All too often people have rushed out in haste, bought a unit and then realized that it does not work properly, no spares are available the unit was a one off from off-shore and one cannot get spares. Of course all of this is a hassle but that is because we have all had is so good for so long that it has been taken for granted!

To summarize then the following should be noted;

- **Do you need to run your entire operation?**
- **Determine essential items to reduce running costs.**
- **Can unit comply with previous points.**
- **Determine static rating in kVA.**
- **Determine dynamic rating kVA (larger unit or flywheel).**
- **How much fuel is required and how and where may it be safely stored.**
- **Manual or auto starting with auto reclosing for remote units.**
- **Single unit or multiple units.**
- **What protection is provided and who does protection settings.**
- **Check speed regulator droop from no-load to full load.**
- **What protection is provided, how and who sets it and how reliable is this.**
- **Ensure correct phase sequence with normal and standby units.**
- **May engine and generator be repaired locally?**
- **Does service provider provide this service or third party?**
- **What is availability of spares?**
- **What is turnaround time for service?**
- **Where is unit manufactured?**
- **Who assumes legal responsibility if person is injured or killed?**
- **Are you and/or your staff competent to operate a standby unit?**

Conclusion

It is hoped that this article has highlighted some of the not so obvious issues related to standby generators. The issues of compliance with equipment standards, safety and professional accountability and operational competence are key if and when things go wrong. When one opts for standby generation one is not only buying a solution but also assuming the total responsibility and accountability assumed by ESKOM or the local municipality. Unfortunately there is no quick fix!

Article commissioned and provided by the South African Institute of Agricultural Engineers (SAIAE) as part of their support to the South African farming community.

Mechanisation planning – each farmer's unique solution

Ebbie Hattingh – Product manager CASE-IH – Northmec
Louis Lagrange – Immediate Past President: SAIAE

There are only a handful of farmers who calculate the real mechanisation cost of their farming enterprize. It is also these farmers who, armed early with the necessary information, can take better and more accurate decisions on what type of machinery will provide the best results, when and what machinery must be replaced and

With the correct aids, the farmer's knowledge of the characteristics of each piece of land on his farm and the technology to measure and to know everything, the farmer can ensure that he has the correct machinery on his farm to complete each tilling operation in the most cost effective manner, within the optimal time.

Each farmer has his own unique managerial style, challenges, requirements and limitations, all that have to be taken into consideration simultaneously to provide a fitting solution for the farmer. Two neighbours can plant the same product with the same soil, climate and rainfall, but due to different managerial styles, risk profiles and objectives need diverse solutions for their mechanisation planning.

Factors that play a major role in determining the best solution for the farmer's needs are:

- Number of available working hours per week. This is influenced by the number of hours per day, days per week, as well as the influence that rainy days have, when the land cannot be tilled.
- Manner of tilling, as well as the timeslot wherein it has to be completed. If different tilling activities have to take place, such as during planting times when soil preparation, planting, spraying and transporting of seed and fertiliser must be done simultaneously, quite a few different tractors and kilowatts are required. This causes a high peak on the kilowatt required during this time. The correct combination of tractors and implements are required to ensure that each of the tilling activities can be effectively completed within the determined timeslot.
- Hectares per hour that can be done by different tractor and implement combinations. This can be explained by for instance looking at the difference between a 4-row or 6-row planter, 14 or 24 metre sprayer, etc.
- Costs related to a specific tilling activity. The tilling activities must be determined for each type of soil to obtain effectiveness and thereby limiting costs with the end objective of ensuring maximum profit per hectare.
- The farmer and farm's specific objectives and limitations.

According to the following two examples, the difference between the two neighbours, who each want to plant 1 000 ha of maize, are discussed.

Farm A:

Neighbour A plants 1 000 ha of maize. He applies stubble-mulch tillage to 70 % of his lands and then ploughs and plants. The other 30 % of his land is tilled with a contra disc harrow followed by tine cultivation. During planting time (timeslot 4 weeks) seedbed preparation is done and then planting. Six weeks later a weeding and spraying activity is done. Neighbour A prefers to plant with a 4-row planter. The farming analysis is as follows:

The equipment required is composed as follows:

Solution	**kW / ha: 0.85**
Crop	Maize
Hectare	1 000
Tractor	71 kW
Number of tractors	12
Stubble mulcher	1
Contra disc harrow	1
Subsoiler	4
Plough	8
Tooth harrow	6
Planter	5
Hoe	7
Sprayer	3

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The cost of each type of tilling is analysed as follows:

Machinery cost Total R/ha	**760.6**
Size	71 kW
Tractor (Rhr/hryear/lifetimeyears)	140.0 / 260 / 12
Stubble mulching (Rhr/Rha)	216.9 /36.1
Contra disc harrowing(Rhr/Rha)	221.6 /140.2
Subsoiling (Rhr/Rha)	204.7 /288.3
Ploughing (Rhr/Rha)	172.9 /205.9
Tooth harrowing (Rhr/Rha)	305.4 /146.1
Planting (Rhr/Rha)	346.3 /183.3
Hoeing (Rhr/Rha)	191.9 / 79.3
Spraying (Rhr/Rha)	393.0 / 54.0
Stubble mulching(hryear/lifetimeyears)	117.0 / 10
Contra disc harrowing (hryear/lifetimeyears)	95.0 / 10
Subsoiling (hryear/lifetimeyears)	106.0 /10
Ploughing(hryear/lifetimeyears)	104.0 / 10
Tooth harrowing (hryear/lifetimeyears)	80.0 / 10
Planting (hryear/lifetimeyears)	106.0 / 10
Hoeing (hryear/lifetimeyears)	59.0 /10
Spraying (hryear/lifetimeyears)	46.0 / 10

The total cost of the solution for neighbour A is as follows:

Cost summary	**Rand / ha**	
Total	1335.8	100%
Tractor	760.6	56.9
Fuel	359.2	26.9
Operators	216	16.2

The fuel consumption for each type of tillage, as well as the hectare tilled is as follows:

Tilling	? /ha	**ha tilled**
	? /ha	71 kW
Stubble mulching	3	700
Contra disc harrowing	11.2	300
Subsoiling	24.9	300
Ploughing	21.1	700
Tooth harrowing	8.5	1000
Planting	9.4	1000
Hoeing	7.3	1000
Spraying	2.4	1000

This analysis shows that the farm needs 12 tractors of 71 kW with the accompanying implements to complete the work in the required timeslot. The total cost that includes mechanical, fuel and operators' costs, is R1 335,80 per hectare.

Farm B:
Neighbour B also plants 1 000 ha maize, with the same rainfall, times of tilling and soil type. However, he has a great stock factor and labour is a problem for him. He prefers planting with 8-row planters and also uses larger tractors. He uses exactly the same tilling and timeslots of tilling, but he ploughs 30 % of the surface. His analysis is as follows:

The equipment required is as follows:

Solution **kW /ha : 0.9**

Crop	Maize		
Hectare	1 000		
Tractor	71 kW	100kW	165kW
Number of tractors	2	4	2
Stubble mulching harrow	1	-	-
Contra disc harrowing	-	2	-
Subsoiler	-	3	2
Plough	2	1	-
Tooth harrow	-	-	2
Planter	-	3	-
Hoe	-	4	-
Sprayer	3	1	-

Machinery cost

Total R/ha: **904.2**

Size	71 kW	85 kW	165 kW
Tractor (Rhr/Rha)	164.0/217/12	247.9/314/12	616.0/198/12
Stubble mulching (Rhr/Rha)	291.5/48.6	-/-	-/-
Contra disc harrowing (Rhr/Rha)	-/-	326.6/147.1	-/-
Subsoiling(Rhr/Rha)	-/-	326.2/326.2	780.3/472.9
Ploughing (Rhr/Rha)	192.4/229.0	313.2/265.5	-/-
Tooth harrowing (Rhr/Rha)	-/-	-/-	929.3/191.6
Planting (Rhr/Rha)	-/-	479.2/126.8	-/-
Hoeing(Rhr/Rha)	-/-	305.7/63.2	-/-
Spraying (Rhr/Rha)	366.5/50.3	874.7/120.1	-/-
Stubble mulching (hryear/lifetimeyears)	50.0/10	-/-	-/-
Contra disc harrowing(hryear/lifetimeyears)	-/-	158.0/10	-/-
Subsoiling (hryear/lifetimeyears)	-/-	129.0/10	95.0/10
Ploughing (hryear/lifetimeyears)	132.0/10	66.0/10	-/-
Tooth harrowing (hryear/lifetimeyears)	-/-	-/-	103.0/10
Planting (hryear/lifetimeyears)	-/-	88.0/10	-/-
Hoeing (hryear/lifetimeyears)	-/-	52.0/10	-/-
Spraying (hryear/lifetimeyears)	60.0/10	17.0/10	-/-

The totals cost of the solution for neighbour B is as follows:

Total		
Tractor	1439.1	100%
Fuel	904.2	56.9
Operators	390.9	26.9
Operators	144	16.2

The fuel consumption for each type of tilling, as well as the hectare tilled is as follows:

Tilling	? /ha	**ha tilled**		
	? /ha	71 kW	85 kW	165 kW
Stubble mulching	3	300	-	-
Contra disc harrowing	11.2	-	700	-
Subsoiling	24.9	-	386	314
Ploughing	21.1	222	78	-
Spike harrowing	8.5	-	-	1000
Planting	9.4	-	1000	-
Hoeing	7.3	-	1000	-
Spraying	2.4	874	126	-

This analysis shows the total cost as R 1 439,10 per ha, 7 % more than neighbour A. This solution however has the potential to change the amount and timeslot according to specific weather conditions. For instance, 20 % more can be planted in the same time or planting can be done faster to reach a deadline if the rain is late. The combination of implements is also totally different. A total of 8 tractors is more acceptable for neighbour B's managerial style and objectives than 12 tractors.

It can be clearly seen from the above, that the farm's specific limitations and requirements play an important role during the determining of the type and amount of combination of tractors and implements needed for a farming enterprise. A farmer can lose a lot of money if he wants to work at a certain kW/ha and then have too many of the incorrect combination of machines on the farm. This can lead to great capital outlay, or that the work cannot be done within the timeslot and all his hectares are not planted at the right time.

Each farmer must ensure that he applies the correct tilling for his specific soil, uses the correct tractor-implement combinations, that the ballasting of his tractors are correct, that the correct technology is used to save on costs and do his mechanisation planning as such to satisfy to his requirements. An agricultural engineer is typically suitable to execute such a holistic analysis and ensure that the solution addresses the farmer's objectives exactly.

UKZN Snippets

Student Vacation work : Frank

Vacation work for students are still problematic with a number of students not being able to complete their degree due to lack of vacation work In this article a student reports on his very positive experience during vacation work.

Tasks to the student:

- Tractor testing
- Pole hammer evaluation and optimisation
- Crop spray evaluation
- Drainage design

The student was also given tractor driving lessons. Prior end of the vacation work, the student gave an oral presentation to the members of the technical department of the company.

What did the student learn:

How to be part of a team of people working together on a project.
The market for your products is all important, and different management strategies for different size clients work well.
Demand and supply determine prices.
Field crops are not easy to manage, climate changes, pests, hail and rain affect them.
How to harvest and transport produce in the right manner for optimum product quality.
How to communicate to visitors.
How to drive tractors.

What did the company gain:

Tractor testing results to base future tractor buying decisions on.
An optimised pole hammer
Knowledge about their sprayers and accurate calibration thereof
Positive visitor telling the market about high quality produce and effective engineering and management.

CPD news

David Clark
SAIAE KZN Branch Chairman

Multi-Day Continuous Professional Development Event 2008

The KwaZulu-Natal branch of the South African Institute of Agricultural Engineers will be organising a multi-day CPD event to be held on 22 and 23 September 2008.

The theme for the CPD event will be Energy, Water and Agriculture and there will be 3 focus areas:

1) Energy and Agriculture;
2) Water and Agriculture;
3) Small Scale Agriculture.

Please make a note of this CPD event in your diary on 22 and 23 September 2008 as it is a good opportunity to continue your professional development and to earn some CPD points.

The details are still under development but we will provide you with more details in the next few months. We hope to hold the event at a venue in the beautiful KwaZulu-Natal Midlands and hope that you will be able to attend.

If you are interested is giving a presentation or running a course at this CPD event then please contact David Clark at (033) 2605485 or clarkd@ukzn.ac.za. Please also consider providing some sponsorship for the event.

News from the branches

A Bird's eye view on the newly elected Branch Chairman of KZN - David Clark

My journey as an Agricultural Engineer began in 1990 when I started as a first year Agricultural Engineering student at the Universityof Natalin Pietermaritzburg. After completing my BSc Eng I went on to complete an MSc Engsimulating the performance of on-road haulage vehicles.

I then took a break from the books and spent a year backpacking in Israel, Egypt, England, Walesand Australia. During this year the need to earn money resulted in some opportunities to get a "get your hands dirty" view of Agricultural Engineering including, picking and packing vegetables in Israel and England, and driving a tractor during the grain harvesting and land preparation season in the Cotswolds area of England.

On my return to South Africal was employed by the Department of Agricultural Engineering at the Universityof Natalfor four years. During this time I did a small amount of lecturing and switched from vehicle performance simulation to the field of hydrological modelling. I then spent a little over two years working at Land Resources International (LRI) where I worked in the field of agricultural and natural resource management. Since September 2004 I have been employed by the Schoolof Bioresources Engineeringand Environmental Hydrology (BEEH) at the Universityof KwaZulu-Natal, working on a Water Research Commission project developing hydrological decision support framework software.

Towards the end of 2006 I was elected onto the committee for the KwaZulu-Natalbranch of the SAIAE and now find my self in the position of branch chairman. Already I am learning a lot about the SAIAE that I had not paid too much attention to in the past.