ALAM Newsletter

Spring 2014

2014 Conference

Plans are coming together for a conference to be hosted at Hartpury College in Gloucestershire. The date is set for the week beginning 21st July 2014.

One-Day Event

Kuhn have agreed to host a day for us, on Wednesday 19th February 2014; watch the website for details, or contact our secretary for further details or bookings.

What's Been Happening

There's various reports from one-day events and recent conferences – we have some catching up to do, as one way or another the newsletter has slipped to the bottom of the pile lately; apologies for this.

We are always open to ideas and suggestions from members for future one-day updates, and names of useful contacts would be most welcome. Please contact the ALAM secretary, Graham Higginson.

Membership

You will find a list in this newsletter of all the paid-up members for the current 2013-14 year, as at the end of 2013.

Contents

ALAM Committee 2013-14

Updates are highlighted in **bold** text.

Position	Name	Work			Mobile	Home	
		Place	Tel	Email		Tel	Email
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Chair Elect							
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	David James	Coleg Meirion Dwyfor		d.james @llandrillo.ac.uk	07919 458878		
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	Paul Clarke						

ANNUAL CONFERENCE 2013

Sands Self-Propelled Machines

17 July 2013,

Neil Sands Welcomed ALAM delegates to their manufacturing facility and Headquarters and introduced his son Tom. Neil and Tom manage Sands Agricultural Machinery. Tom overviewed the history of the company; originally Neil was a Agricultural chemical supplier and contract sprayed using a converted Bedford lorry with a mounted sprayer unit, as more farmers wanted to do their own spraying Neil sold the chemical company to Bayer and 38 years ago constructed and introduced the first self-propelled forward control crop sprayer in the UK - the model FC, based on a David Brown 63hp skid unit having a 2000L sprayer tank capacity and 18M booms.

Since launch development land marks have included pneumatic sprayer controls in 1979, hydrostatic drive, easy dismount, vehicle suspension and 24M booms in 1981, 50/50 weight distribution and adjustable axles in 1985, Hillsider version in 1987, new generation R.O.P.S. and a further tank capacity increase to 3600L in 1991, 30M boom in 1995. Low line series with a lower centre of gravity in 1996, 32M booms and prime purge system in 1998, futuristic cab with multi-function joystick control in 2000, self-levelling suspension in 2001, lower centre of gravity incorporating a cranked chassis, developments of the hillside models, four wheel steer, smart drive traction control and 36M boom in 2003, load sensing, headland control and extra high clearance in 2005, Tier 3 engines, 40M booms, 5500L capacity (largest capacity sprayer in UK), dynamic braking and ‘drive by wire’ in 2006, introduction of Vision series, with panoramic RS Taylor cabs and total ‘arm rest control’ in 2009. Current developments have included hydrostatic track control – 72 – 84” most common but more customers’ are experimenting with 112”, Tier 4i up to 360hp engines (208hp is most common) are currently being used and development work continues including trailing ‘booster braking’ with the aim of stopping the vehicle within its own length from maximum speed and total carbon cab filtration, progressing with innovation and technology, legislation and current practices, approved codes of practice updates and introduction.

There are currently 400+ known sprayers in the world, sprayers have been exported to many countries including Europe, Sweden, South America, Australia and New Zealand.

The tour of the manufacturing facilities commenced with the chassis which is made, including the booms and other components, in-house using specialist rigs and manufacturing techniques, these include laser cutting, puddle welding, tacking, ‘de stress’ heating, dimensional checking and final welding, These assemblies are left to ‘cure’ before final dimensional checking, shot blasting to provide a key for painting and round off sharp edges prior to electrostatic spraying, which provides a minimum coat thickness of 200 microns, (compared with an automotive vehicle which is 70-80 microns thick) the booms receive a special primer coat to protect against the harshness of some chemicals which are used in crop husbandry.

There are five main ‘bays’ of assembly, at the 1st bay components are assembled to the chassis, electrics and pneumatics routed, the 2nd bay includes axles, engine and hydrostatics, the 3rd bay includes, cab, filters, oil coolers, completion of hydrostatics and electrics and at the 4th bay includes spray pack, booms, pumps, clean water system, and at the 5th bay the wheels are fitted and the machine undergoes comprehensive operational testing and adjustments.

The tour included an inspirational insight into research and development where use is made of 3D CAD, Auto Desk Inventor and computer animated models, delegates were able to observe 360° computer animated testing of individual components as well a computer animated working models of assemblies, it is claimed that using these current techniques up to 80% of research and development can completed.

Depending upon specification, an up to 24M boomed model takes 2 days to manufacture and an over 24M boomed model takes up to 1 week. The company prides itself on manufacturing a machine incorporating individual customer requirements e.g. to gain maximum machine utilisation customers in Sweden use a machine for spraying season, remove the sprayer and fit a purpose built snow plough and 4 tonne salt spreader for the winter months.

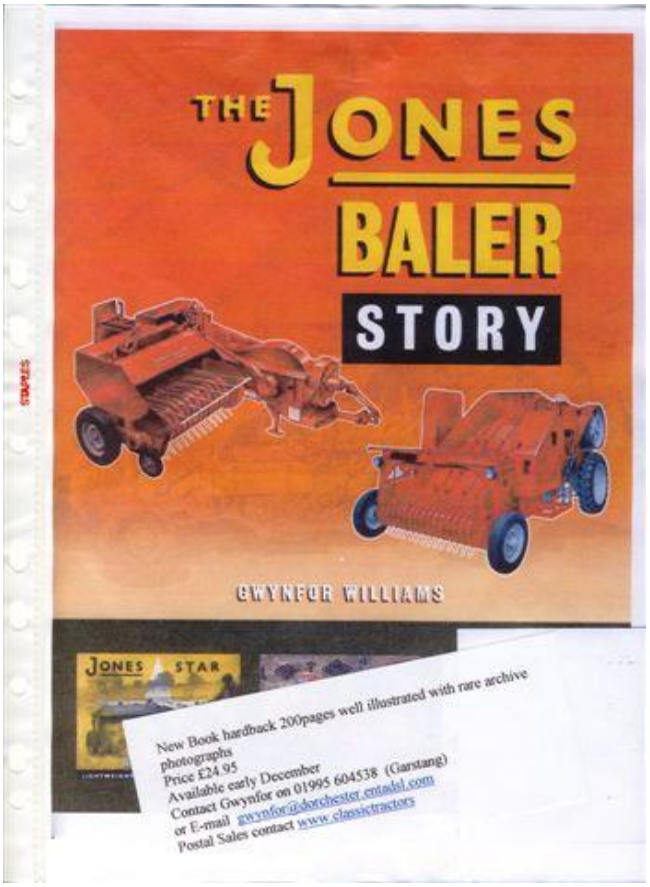
Machine security is an increasing issue from the theft and insurance perspectives, all current production machines have a range of security features' including Data Tag, micro chipping and spirit marking.

Currently there is a healthy order book of up to 1 year, the largest market, 45%, is the UK, followed by New Zealand, Europe and the rest of the world.

Ian Coleman
Hartpury College

ALAM BOOK NEWS

The Jones Baler Story



ALAM Member Gwynfor Williams has been busy compiling this book, and it is now in print.

It's in hardback, with 200 pages and rare archive photographs.

ISBN 978-1-904-686-23-1

Price £24.95

ONE-DAY EVENT

Amazone

"Female Warrior of Legend"

27 October 2011,

Having travelled up to South Yorkshire as navigator of our group, and arrived at our destination early, things looked promising for the day, in spite of the damp weather. After a welcoming coffee the assembled group were officially greeted by Mr Simon Brown, Amazone UK Brand Manager, and Nigel Jones , Technical Sales for the South West region; who were to be our mentors and hosts for the day.

Firstly we were given some background to the company which was founded in 1883 by Heinrich Dryer in Northern Germany near Osnabruck. The first machine which he produced was a hand driven grain cleaner in 1891 followed by a trailed fertilizer spreader in 1917. Many further developments have taken place along the way but the company has remained family owned and run to this day and is currently managed by Justus Dryer the Engineering Director and Christian Dryer the Commercial Director. The company's main operating base is still in northern Germany with sites at Hasbergen--Gaste where fertilizer spreaders and crop protection implements are made and where the main parts centre is based; Leeden where sprayers are manufactured and Hude near Oldenburg where tillage and seeding machinery is produced. A base was established just over the border at Forbach in France in 1970 to overcome the troublesome Import tax which was levied before the Common Market was established. The factory now produces all the groundcare machinery for the company. A company called BBG was taken over in the 1990s in the Leipzig area of Saxony in what was East Germany and the factory now produces the compact disc harrows, mulch cultivators and the trailed centaur cultivators for the company. In 2006 a factory was established at Samara in Russia which produces a range of machines which are packaged in knock down or kit form and loaded into containers for export to a number of countries including China. More recently in 2008 another factory at Auneau near Chartes in France has been aquired where the range of self propelled sprayers are produced.

The company has established sales divisions in France, Poland, Ukraine, Serbia / Montenegro, Russia and the UK. The company employ over 1500 people and in 2010 had a turnover of Eu 290 million of which 80% was export business to over 70 countries.

Sprayers.

The range of sprayers have been thoughtfully engineered and carefully laid out to achieve operator convenience and control; while minimising inconvenience and possible contamination when preparing to spray, and upon completion of the work. All spray control panel layouts have been standardised across the range and the chemical induction bowl is positioned adjacent to the control panel for ease of operation. Following use it is hinged back into its protected storage position. Chemical formulations including powders are thoroughly mixed and transferred into the sprayer main tank, or tanks if the 1000L tractor front tank is fitted. Tank agitation can be adjusted to suit the product being applied. Boom design incorporates "syncro lock" a balanced sequential opening and folding action cleverly enabled by carefully placed simple spring loaded lever operated hydraulic isolator valves which ensures the sections remain equally balanced throughout the operation. When in the transport position the two closed sections are located vertically and secured on wedge locks at each rear corner of the machine frame when the boom is hydraulically lowered. In this position boom movement in transport is minimised and spray contamination of the machine controls is also eliminated.

A range of trailed sprayers with capacities from 3200 L to 11200 L

are also available with boom widths from 18 to 40 metres. There are a number of options of steered axles including hydraulic and electronic to enable the sprayer wheels to minimise crop damage by

following as accurately as possible those made by the tractor. The boom to axle pivot distance has been kept to a minimum in order to maximise drawbar weight transfer to the tractor and the braking system is load sensing. Accumulators are used as part of the hydraulic circuit for the boom height control in field and for suspension in transport. The booms are mounted on parallel linkage trailing arms at the rear of the chassis enabling a range of spraying heights from 0.5 to 2.5 metres.

A system called Distance Control can be fitted to the booms to enable them to remain parallel to the ground surface even in undulating conditions. Auto boom height control is designed to maintain accuracy and minimise spray drift as it has been found that an increase in spray height from 40 to 60 cm above the target can double drift. All sprayers use diaphragm pumps matched to the capacity and size of the machine. The larger pumps have the capability of delivering 500 to 800 l/ min for filling together with an auto shut off facility.

Booms can be equipped with nozzle systems which have the capability to deliver low volumes through to high volumes which are required for liquid fertilizer application. Nozzle technology has been developed to enable a wider range of volumes to be delivered, this has been achieved with boom mounted variable flow ports with a rubber sleeves which stretch in a controlled manner to produce a larger hole as the delivery pressure is increased for liquid fertilizer. Another system is the Twincap nozzle which has 2 spring loaded ball bearing valves , one of which opens a second flow port into the nozzle enabling higher volumes to be delivered. These systems are supplied by Billericay and Agritop. Boom end nozzles with modified spray patterns are also used for boundary work and other specialist nozzles are also available.

Amazone have now been in the self propelled sprayer market for about 4 years with a short wheel based variable track width machine with 4 wheel steering. It is powered with a 200hp Deutz engine coupled to a hydrostatic transmission, the chassis hydro pneumatic suspension system also incorporates boom stability function. The DUS pressurised spray liquid circulation system ensures the chemical is thoroughly mixed at all times and that the whole boom is constantly fully primed to ensure full coverage the moment it is switched on. After use this system will allow the boom to be completely rinsed out without the need to spray any liquid through the nozzles.

The cab is supplied by Claas and has recently required development to meet new stage 4 regulations for a pressurised sealed unit with full air filtration.

All sprayers can be used in conjunction with the precision farming system to varying degrees according to their specification and sophistication. Considerable care and thought in the design has been given to tank shape to achieve good stability and ease of cleaning. Some machines are fitted with a hand lance to wash the exterior surfaces and a new boom wash system is available as an option.

Fertilizer Spreaders.

This is probably the iconic machine we associate with Amazone who now produce about 13,000 each year.

Model	Type	Capacity	Spread width	Notes
ZA-X	Mounted	500 to 1750 litres	10 - 18 metres	
ZA-M	Mounted	1000 to 3000 litres	10 - 36 metres	
ZG-B	Trailed	5500 to 8200 litres	10 - 36 metres	
ZG-B	Trailed	5500 to 8200 litres	15 - 52 metres	Ultra Hydro disc drive

Most fertilizer in Germany is purchased through farm co-ops and delivered in bulk, for this reason the hopper loading height on the mounted machines has always been a major consideration in the design. Amazone have their own spreader test facility which they use extensively to produce spread charts and calibration tables for the user. This information is available online through the website. This critical information has become necessary to maintain machine performance and accuracy in the face of ever increasing spread widths with extremely variable product flow characteristics and size. Consequently all variations of all fertilizer manufacturer's products have to go through the test process and charts are produced and saved on the company website, the data base now holds in excess of 10,000 different material tests. If the customer cannot find a chart for the material he is using there is a system which enables a close equivalent to be identified by comparison with visual appearance, particle size, surface

finish and weight. This will then give guide settings to enable calibration of the machine to take place. As increased spreading widths have constantly been sought it has presented the machine manufacturers with the challenge of consistently maintaining accurate spread patterns. The increased spread widths have necessitated increased disc speeds and the importance of accurate fertilizer placement on the disc has become critical. The gentle handling of the fertilizer during its acceleration along the vanes is also required to prevent it being powdered. Shutter position in relation to the disc and shape of the opening are very carefully arrived at during development.

As the spread widths of machines continued to increase to meet market demand Amazone found that they were quickly outgrowing the size and capability of their 40 metre long test hall. This eventually resulted in them making arrangements to use the Danish test facilities, which required booking some weeks in advance and only having use of the facility for short periods of time. It was quickly realised that this arrangement was inflexible and impractical and prevented the immediate testing of new products as they became available. An ingenious solution was devised and installed at their own company test hall which involved mounting and running spreaders on a vertical pillar at one end of the hall and rotating the pillar through an arc of 180d to test one side of the machine output at a time . Two tests would produce results which could then be correctly superimposed to give the overall spread pattern. They can now complete up to 6 tests per day. If you visit the Amazone UK website you can view a series of informative videos of their machines including one on fertilizer spreader testing.

All machines run a contra rotating disc spreading system, each disc having easily adjustable spreading vanes and running at a standard speed of 720rpm. For headland work and working near water courses the disc speed is reduced to 300rpm and a deflector shield is activated from the tractor seat to reduce width and redirect the fertilizer to maintain accurate coverage.

Dependent on model the degree of automation required can include weigh cells, hydraulic spread system drive, GPS + forward speed related accurate spread rate control, accurate automated control of application to deal with wedge shaped ground and the deployment of the boundary deflector device for headland field boundary. Added to this are the auto shutter operation to start and stop spreading at the headland coupled with the GPS Track parallel driving aid and finally the N sensor unit to detect the nitrogen requirement coupled to the ability to adjust and deliver on the move in field. At this stage I will leave you to decide how to maintain the driver's concentration and keep him alert! In fairness, with the cost of fertilizer what it is, any mechanism to increase efficiency and make savings must be recognised and commended.

In this report I have tried to cover the two types of machine we concentrated on, drills cultivators and power harrows were also briefly discussed but I will leave you to explore those at your leisure.

As mentioned above Amazone UK have a website which contains a wide variety of useful information and video clips on their range of machines, particularly the power harrow testing sequence, which are a likely to prove a useful teaching resource for the future. Before departing our hosts were thanked for their efforts in making this a very interesting and informative day.

J.Gough.

ANNUAL CONFERENCE 2012

Bicton EaRTH

Environmental and Renewable Technologies Hub

16th July 2012

The evening visit commenced from outside the main hall with a tractor trailer ride to the college farm where the EaRTH centre is situated. There we were joined by Mr David Henley, the principal, who ushered us into a long wood clad building with a pitched roof adjacent to the farm dairy unit. Once inside we were shown to a room at one end where we were given a short presentation about the history of the building, the reasoning behind the conversion and the role it now plays. Two years ago it was a collection of derelict brick built farm buildings which had been a stable and storage sheds and was under consideration for demolition. Inspirational thought and a recognition of the environmental responsibility and example which the college should demonstrate within the county has resulted in the conversion of the buildings to an environmental technologies centre which is used for educational and experimental purposes for both the college and local business.

Funding a development such as this was a critical factor, the County Council provided a grant of £400,000 which had to be matched by the college. A further £100,000 was sourced from a fund Making it Local and an invest to save loan of £600,000 was also accessed. The photo voltaic panels were sponsored by EDF energy to the sum of £30,000. In total the project cost £1.3 million and was completed in February 2012. Design and building work were undertaken by local companies. The centre was officially opened by the Education Minister, Michael Gove on 11th May 2012. Recognition of the importance of using our environment and resources in responsible and morally accountable manner has resulted in the existing structure being adapted and developed into a modern energy efficient structure which now has a new and important role in raising awareness, knowledge and skills for the future. The original brick walls have been retained and lined on the outside with cardboard and sheep wool insulation and clad with cedar timber. Large double glazed windows and doors have been fitted to the south facing wall together with horizontal louvers to reduce glare but enable natural light to enter. Under floor heating has been installed with a section left exposed under a glass panel for viewing. There are two layers of pipes, the top for heating and the lower layer for cooling to enable control of the internal temperature. The pitched roof has a 10kw photo voltaic array and solar thermal heat panels fitted while inside there is an air source heat pump and a 50kw biomass boiler which is predominantly used in winter. All four of these systems are interlinked and controlled to heat a 1500 litre tank of water with the most efficient and productive energy source at any one time. The hot water tank has

an over capacity for the needs of the EaRTH building and the excess is drawn off to the farm dairy where it is used for cleaning purposes on a regular basis. This has resulted in an estimated saving of 10 to 15kw per day electrical cost for the farm.

While down at the farm we also witnessed the operation of an energy efficient vacuum on demand milking pump which only ran at a speed necessary to maintain adequate vacuum for the work required. The drive speed was controlled by a unit which monitors vacuum level and adjusts the electrical supply frequency to vary the drive speed to match vacuum demand. Other energy saving systems under consideration for the farm include electrically driven quad bike, heat exchanger for milk cooling and a bio digester. Rain water harvesting is another aspect which will provide savings and make further environmental efficiencies.

Back in another part of the EaRTH centre there were demonstration mock ups of the different energy systems including a cutaway biomass boiler showing the waterjacket, fuel feed system and heating tubes and flue system together with two types of solar thermal panels. The operational pipework, pumps, control valves and well insulated storage tank were also open to view. This generated considerable curiosity and interest among the group who spent some time discussing the pros and cons of the different technologies with Graham Waddell, head of the EaRTH programme.

The centre will be open for use by schools, the college, the public, industry and business. The intention is to use it for educational, training and general awareness raising of the possibilities which these various technologies offer. Use of the centre for conferences and seminars on this and associated subjects should keep this unit in the forefront of sustainability and energy efficiency for many years to come. Well done Bicton, may your initiative be an example to others and a beacon for the future.

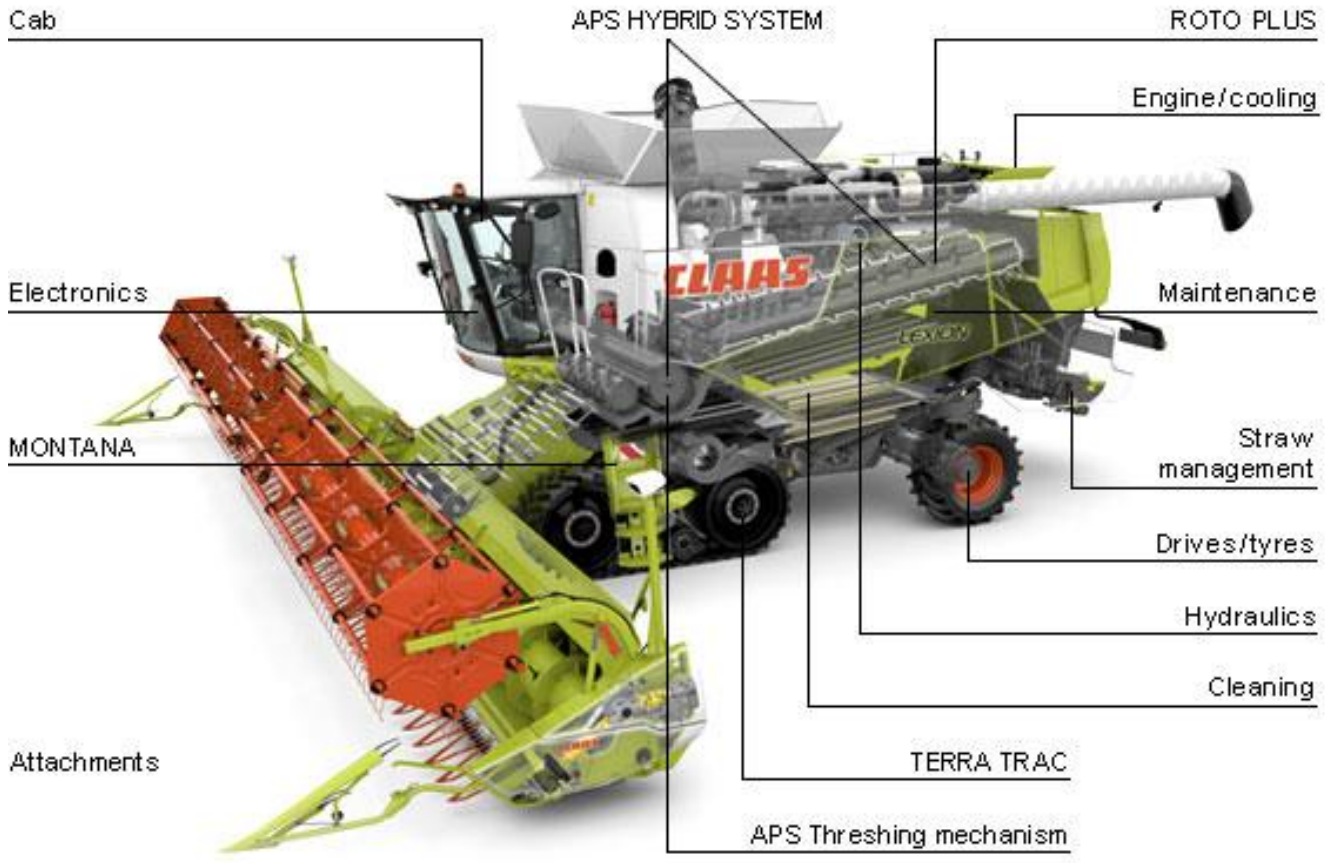
John Gough

July 2012

ANNUAL CONFERENCE 2011

Harvesting Systems

The training on harvesting systems focussed on the new Lexion 700 Range of combines these are known as the APS or Hybrid machine which includes the APS Drum and twin rotors. These machines are new for the 2011 Harvest Campaign.



The machine has changed very little in terms of hardware technology since the 480 back in the 90's but the software is on the other hand a very different story. Everything has got bigger since the late 90's with a drum width of 1700 mm, Tracks, 500 plus HP 12 meter header and 12000 litre grain tank capacity the 770 is an awesome machine.

The driver can chose from a range of steering systems form laser pilot which follows the edge of the crop, to full GPS CRUISE PILOT. This is a Satellite controlled guidance system that allows the operator to set the machine to cut out perfectly aligned parallel passes without missing overlapping of creating extra short work thus efficiently harvesting the field.

CEMOS is perhaps even more sophisticated allowing combine settings to be saved for each crop and each condition. It can also take into account attitude of the machine be it decrease fan speed on a hill or open sieves at the ins and outs.

CEBIS is the interface between operator and machine it monitors and displays machine functions settings and performance all on one screen. Fuel level and temperature, grain loss and returns right through to flagging up error codes.

Telematics is an incredible piece of engineering where any CLAAS vehicle fitted with the software can be located and interrogated from anywhere in the world. Data can be found on the output and yields of a Lexion cutting Soyabeans in Argentina as easily the forward speed of a Jaguar cutting maze in Kansas. Farmers can watch their operators harvest on Google earth and monitor the machines performance from the comfort of their office.

This is all well and good but what is under the hood so to speak? This depends on the model and could be either a Mercedes or a CAT. It would appear that the CAT engines did not fit in the larger machines so they had to go to Mercedes introducing another supplier and another load of diagnostic software. These engines crank out a massive 500 Hp requiring 800 litres of fuel to be carried.

I said no major hardware changes which is not strictly true because with 70% of new machines running on tracks a new straw chopper design wider headers and massive grain tank there clearly have been big improvements. The Track machines add another £20000 to the price but reduce ground pressure to below 6psi even with a total machine weight over 20 tonnes unladen weight. It offers smooth ride even feeding and means the machines can travel when all wheeled machines have long stopped. (just don't get a tracked machine stuck)

All this for a mere £440 000!!! (bargain). Outputs obviously vary but at 5 Kmh with a 12 meter header in 5 tonnes of wheat I work out a spot rate to be nearly 75 tonnes per Hour!!! Assuming depreciation (perhaps conservative of 10% per annum) and assuming the customer gets a discount of 10% and buys this machine for £400 000 then the depreciation cost would be a mere 40K for the first year. Now in terms of harvesting wheat @£168 per tonne (ref FWI 22 July 2011) £40 000 is a mere 3 hours worth of harvesting. So one could say (if I were working for CLAAS UK marketing) that the machine pays for itself in 3 hours!!!! However if you then took into account the 80litres of diesel an hour @£60 and £10 an hour for the man on the seat then it all becomes more expensive to say nothing of the other machinery and establishment costs.

My thanks to ALAM for inviting me and special thanks to John Palmer, Mark and Andrew for their excellent training I hope to see you all at the next meeting.

Nigel Cosby

Askham Bryan

ANNUAL CONFERENCE 2011

Class GPS Systems

Global Positioning Systems and Automated Steering Systems – Andrew Dunne.

Many of us will be aware of Global Positioning Systems (GPS) steering assist systems through the trade press. GPS systems rely on a constellation of satellites which give a visible minimum count of satellites to the devices, to give triangulation. These orbit Earth as high as 20 200km! An example of a constellation is given in Figure 1

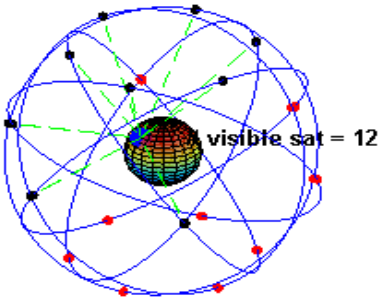


Figure 1. An example of a Satellite Constellation

The following satellite constellations are commercially used throughout Europe and Russia – EGNOS, Glonass and Gallileo. The Chinese are developing the Compass constellation. This is expected to be available to Chinese operators within 2012 and globally by 2020.

All satellite positioning systems experience errors. These occur in different layers of the atmosphere, for example in the Ionosphere and Troposphere along with signals reflected from buildings. Selective Availability is another cause of signal error. Selective Availability was turned off, i.e. all satellites are permanently switched ON, in 2000.

There are two levels of signal accuracy. Level 1 (L1) operates at a frequency of 1575.42MHz and has an error of up to ±12 metres. The make-up of the L1 error is given in Table 1. Level 2 (L2) operates at a frequency of 1227.60MHz and has an error of ±7.5 metres.

Source	Distance (m)
Effects of Ionosphere	±5.0
Variation in satellite orbits	±2.5
Clock faults of satellites	±2.0
Effects of Troposphere	±0.5
Multipath errors	±1.0
Calculations and rounding errors	±1.0

Table 1: Sources of Errors in Level 1 Satellite Signal.

The L1 signal provides a course acquisition code along with a precision positioning code. The L2 signal provides a precision positioning code only. By using dual frequency receivers it is possible to determine ionospheric effects, as different frequencies have different transit times through the spheres.

This error is acceptable form some operations, such as fertiliser and manure applications to grassland, for example, when using a spinning disc type applicator. However, for other applications it is unacceptable, typically when performing cultivations or drilling. The correction signal must be provided from a fixed base station. This could be in the form of an on-farm Real Time Kinematic (RTK) base station. This needs to be positioned as high as possible, such as on a grain silo or building. Alternatively, CLAAS UK use fixed RTK base stations operating on four different frequencies to provide RTK signals to subscribers. The base stations are fixed onto many buildings such as CLAAS dealers' premises or grain silos. This service is presently available to the more arable areas of the Eastern counties, though there are plans to extend this. The coverage as at January 2011 is shown in Figure 2.

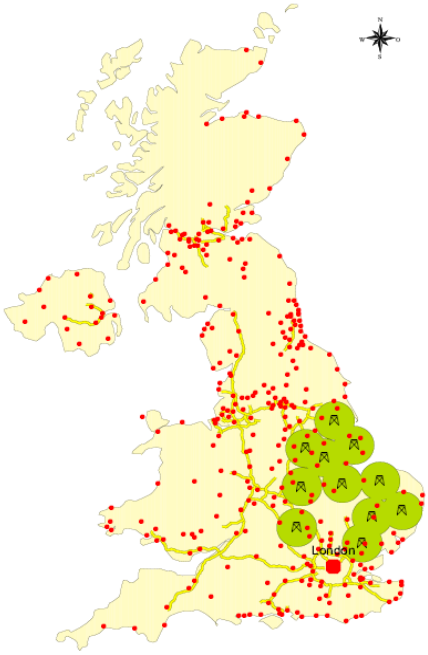


Figure 2: Claas RTK coverage (Jan '11)

The CLAAS RTK correction signal service in the UK is nothing new to CLAAS. In Germany, around 8million Hectares are currently covered by CLAAS. To achieve best coverage, the transmitters are mounted as high as possible. However, they are not mounted on wind turbines or on towers belonging to telecommunications companies. An example is shown in Figure 3

Figure 3: A CLAAS RTK Base Station.

An alternative method of correction is to use a geo-stationary satellite. A geo-stationary satellite maintains a reference to a fixed point on Earth. EGNOS provides a free signal with ±0.5m accuracy, whereas OMNIstar provides a more accurate signal on a subscription basis.

A further alternative is the use of RTKnet. This uses the mobile phone network to send the correction signal over GPRS network. This is shown in Figure 4.

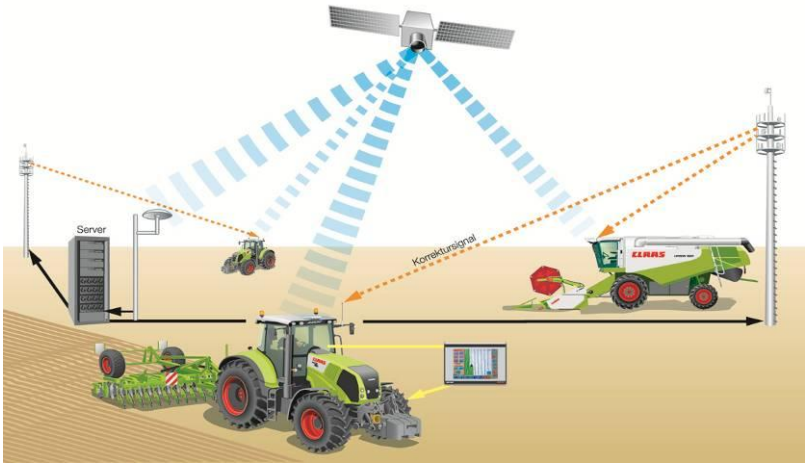


Figure 4: RTKnet correction

RTKnet has a cost dependant on the mobile phone operator's mobile data SIM rate rather than mobile call SIM charges. This offers an alternative to OMNIstar correction signal, with an accuracy of ±30mm. As this system uses the mobile phone network, the operational limitations are those of the mobile network rather than the RTK base station signal strength/power.

To maximise the efficiency and effectiveness of GPS systems, these are now integrated with the steering of self propelled machines, such as tractors, combine harvesters and forage harvesters. The traditional hand-powered steering orbital valve is now combined with electro-hydraulic control. The electro-hydraulics controls the steering cylinders to provide pass-to-pass accuracy to a 'fixed' width of an implement of header attachment. Don't panic though; manual over-ride of the steering system is detected by a steering column mounted sensor!

As with all mechanical or electronic systems, they are only as good as the setup and operating parameters and conditions. Some of the parameters and conditions affecting the accuracy and effectiveness of GPS steering and positioning systems are:

- Position of the GPS antenna
- Position and fixing of the system ECU
- Inclinometer calibration
- Steering sensitivity
- GPS signal conditions
- Tractor / machine ballast
- Tyre pressures
- Wheel base of the machine
- Steering mechanicals – wear in ball joints etc.
- Steering type – 2WS, 4WS, crab steer, articulated steer
- Implement side-pull
- Mounting of machine – 3PL fix/float, sway
- Mounting position – front mounting imposes load onto the steering system
- Machine actual working width not the brochure working width – 4m is not always 4m!
- Soil type
- Soil water content

There are approximately 400 CLAAS machines in the UK using RTK. Co-operative Farms use GPS steering with RTK correction on their key machines. It was found that there was an average of 10% overlapping when drilling. Not too much?? Though if you farm 10 000 acres it a not inconsiderable area! Think of the extra input costs to farm an extra 1000 virtual acres.

It is suggested that a 2500 acre farm will recover the cost of fully integrated GPS steering within 3 years, whereas an £800 light bar guidance system can be recouped within 3 weeks when spreading fertiliser alone on a dairy farm!

Graham Higginson

ALAM MEMBERSHIP 2013-14

This is the list of all those whose membership has been renewed as of the end of 2013.

We still a a couple of unresolved issues with unidentifiable standing orders so please ask your colleagues to check their bank statements– if any have standing orders taking money from their bank but are not on this membership list, please get in touch with the treasurer.

Name	Member No.	Mailing address
Gerald Anderson	13/074	Easton College
Bruce Badger	13/071	Sparsholt College
Tim Ball	13/076	Reaseheath College
Robin Blackford	13/044	Home address
Denis Bloomfield	13/069	Otley College
Lee Brown	13/002	Reaseheath College
Chris Brown	13/084	Home address
Denis Cartmel	13/057	Home address
Harry Catling	13/062	Royal Agricultural Col.
Stuart Christie	13/027	Cannington College
Paul Clarke	13/058	Newton Rigg
Richard Clarke	13/056	Otley College
Ian Coleman	13/014	Home address
Peter Coleman	13/072	Home address
Chris Creasy	13/066	Home address
Kevin Davenport	13/052	Myerscough College
Alan Davey	13/039	Cannington College
Wynn Davies	13/030	Home address
Jason Day	13/004	Babcock
John Dixon	13/054	Lackham College
Neal Dodd	13/023	Coleg Powys
Oliver Dunthorne	13/080	Home address
N Edward	13/078	
Sandy Ellis	13/037	Askham Bryan College
Colin England	13/021	Kingston Maurward Col.
Nigel Fox	13/055	Sparsholt College
Andrew Frank	13/013	Home address
Richard Gargett	13/007	Newton Rigg
Philip Goddard	13/036	Home address
John Gough	13/HON	Walford College
Julian Greenman	13/035	Lackham College
David Harris	13/051	Brinsbury College
Paul Harrison	13/008	Otley College
Steve Hasell	13/038	Cannington College
Richard Heath	13/020	Home address
William Helen	13/006	Home address
David Heminsley	13/HON	Home address
David Henley	13/063	Bicton College
Trevor Hicks	13/082	Hartpury College
Graham Higginson	13/022	Reaseheath College
Vic Hird	13/050	Brackenhurst College
Tony Houghton	13/016	Home address
Phillip Hurrell	13/048	South Cheshire College
Tim Hutchinson	13/042	Warwickshire College
David James	13/025	Coleg Meirion Dwyfor
S James	13/003	Carmarthenshire
Melvin Johnson	13/009	Reaseheath College
John Jones	13/059	Home address
Chris Keeble	13/HON	Home address
Brian Kessell	13/024	Duchy College
David Lankester	13/046	Writtle College
Nigel Macpherson	13/060	Sparsholt College
Patrick McLeod	13/034	Hartpury College
Chris Morgan	13/011	Walford College
Tym Morgan	13/043	Warwickshire College
Richard Newman	13/041	Home address
Brian Nicholls	13/033	Reaseheath College
Tim Northmore	13/029	Kingston Maurward Col.
Mike O'Dowd	13/HON	Home address
Robert Patmore	13/068	Home address
Brian Poulson	13/015	Home address
Freddie Pullan	13/065	Walford College
Robert Rattray	13/064	Home address
Paul Reynolds	13/083	Hartpury College
B Robert	13/077	
David Ross	13/049	Newton Rigg College
Jon Sarsfield	13/047	Home address
Danny Sellors	13/085	Cornwall College
Michael Sidlow	13/045	Lackham College
Graeme Smith	13/032	Reaseheath College
Roger Soper	13/079	Home address
David Sparkes	13/012	Home address
David Stephenson	13/053	Home address
Charles Szabo	13/028	Riseholme College
Ian Taylor	13/018	Barony College
Emlyn Thomas	13/073	Home address
Mark Towers	13/001	Reaseheath College
Martin Towsey	13/019	Brackenhurst College
Tom Turney	13/HON	Home address
Mark Tyson	13/040	Home address
Steven Wade	13/081	Newton Rigg College
Arthur Walker	13/HON	Home address
Peter Walley	13/070	Home address
Stephen Watson	13/067	Riseholme College
John Welwood	13/026	Home address
Ian Whitehead	13/HON	Home address
Gwynfor Williams	13/HON	Home address
David Williams	13/086	Llysfasi College
David Wilson	13/031	Home address
Duncan Wilson	13/075	Home address
Peter Woodliffe	13/061	Home address
Paul Wray	13/010	Home address

ASSOCIATION OF LECTURERS IN AGRICULTURAL MACHINERY

Membership Application Form

Title	Initials	Forename		Surname	
Home Address			College Name		
			Address		
Postcode			Postcode		
Phone			Email		
My connection with education in agricultural/horticultural engineering is:					
Signed			Date		
Proposer (Member of ALAM) If you don't know any members, just return the form and we'll arrange contact with one in your area.					

HOW TO PAY- The current rate is £10 per annum, payable on April 1st each year.

By cheque: Cheques should be crossed and made payable to "The Association of Lecturers in Agricultural Machinery", and sent with this form to the treasurer.

By standing order: It will help us provide an efficient service to members if you pay subscriptions by Standing Order, by completing the following, and returning the whole form to the treasurer.

Bank Name	Name of Account
Branch	Account No.
Address	Sort Code
	Payment Reference
	Please write your Initial and Surname as a Payment Reference in the space above, to ensure ALAM can clearly identify your payments.
Postcode	

Please pay to Lloyds Bank, 12 Lendal, York, YO1 2AF, (Sort Code 30-99-99) in favour of The Association of Lecturers in Agricultural Machinery (Account Number 1373714), the sum of £10 immediately, and then annually on the first of April each year, until cancellation by me of this standing order, debiting the account specified above.

This order cancels and replaces all previous orders in favour of The Association of Lecturers in Agricultural Machinery.

Signed	Date

Standing Orders are for a fixed amount, which can only be altered by you. It is not a Direct Debit, which allows the payee to vary the amount drawn.

Return completed forms to David Heminsley, ALAM Treasurer,
The Old Byre, Lower Street, Doveridge, Ashbourne, DE6 5NS.

For use by the treasurer							
Details recorded		Payment received		Bank Order processed		Member number	

Form revised June 2009