

Down the Line

BEELINE Farmer NSW Farmer of the Year

Guidance technology is giving growers the opportunity to farm smarter according to 2005 NSW Farmer of the Year and BEELINE user Scott McCalman from Warren in north-western NSW.

Scott and his wife Jo have been using GPS guidance on their property, Jedburgh, for three years after spending twelve years working to a controlled traffic (CT) program using marker arms.

According to Scott, the next logical move was to invest in GPS guidance, a step they took in 2003 with the purchase of two BEELINE GPS guidance systems.

“We used marker arms effectively for twelve years, but the introduction of guidance took our CT operations to the next level by taking away operator error and providing us with exceptional accuracy,” Scott said.

“Guidance is now an integral part of our operation as it allows for efficient inter-row planting, shield spraying, offsetting from the previous year’s plant line and more efficient ripping, land planning and listening on irrigation country”.

Scott’s expertise and dedication to CT and no-till practices, made successful by utilising guidance technology, was recognised in July when Scott was awarded the 2005 NSW Farmer of the Year.



2005 NSW Farmer of the Year, Scott McCalman

Whilst it is possible to carry out CT and no-till operations without guidance, Scott said the results are less than desirable with random soil compaction occurring, taking away the opportunity to fully optimise yield.

“Guidance took our CT program to the next level as it meant we could guarantee accuracy, which lead to improvements across all our operations,” Scott said.

“We consider ourselves to be ‘soil cover farming’ these days as we are using guidance to carry out CT and no-till practices which increase both microbial activity and moisture levels in the soil.

“Our aim is to preserve the soil structure and leave it in its most natural state, a strategy we can achieve using guidance.”

Scott is keen to see other growers take up CT and no-till farming practices with the assistance of available farming technology.

“GPS guidance is in a growth stage with more and more growers looking to adopt the technology in the coming years,” Scott said.

“The return on investment by utilising GPS guidance is both immediate and ongoing and you can be sure that your investment in a highly accurate system will pay for itself.”

Welcome

Welcome to the BEELINE Technologies *Down the Line* newsletter – a publication designed to give BEELINE users useful information on their systems and other topics related to GPS guidance technology and its applications in everyday farming activities.

As a BEELINE user you can consider yourself an innovator in

your field. You are using the best available technology to improve your farming practices.

Your use of GPS technology is helping both the economic and environmental sustainability of your industry by improving the way you carry out your everyday operations.

We hope this newsletter gives you valuable information about BEELINE and helps you get the best out of your

system. Your feedback on the content of this newsletter is valuable so we can provide you with information that will assist with use of your BEELINE system.

Peter Williams

BEELINE Technologies CEO

Facts about GPS

GPS was originally built for US military use in the 1970s.

We have former US President Ronald Regan to thank for allowing public use of the system in the early 1980s – but its accuracy was limited to about 100m in those days due to Selective Availability (SA), a deliberate distortion of GPS signal to limit its accuracy for civilian use.

It was Bill Clinton who finally signaled an end to SA in 2000, a major turning point that has helped GPS become a global utility used around the world in numerous civilian and commercial applications.

GPS signal is now accurate to around 10 to 20m without any differential correction.

Innovative Australians using guidance

GPS guidance was once seen as the domain of cotton and grain growers, but this view is rapidly changing with the successful application of guidance across a variety of Australian agricultural industries.

From cotton to small crops, macadamia nuts to olives, GPS guidance is becoming a necessary tool for growers Australia wide.

According to precision agricultural specialist Ross Hubbard, farmer and Managing Director of Agline Distributors, GPS guidance is becoming a tool that the majority of Australian growers are either currently using or seriously contemplating incorporating into their practices.

“Whilst it all started with straight lines, GPS guidance is now providing growers with the opportunity to do so much more than simply drive straight down a row,” Ross said.

“Guidance has given growers the opportunity to improve the way they farm and take control of the resources they can influence to safe guard against those they can’t.

“This can be seen by the number of farmers who are turning to controlled traffic, no-till, yield mapping and variable rate practises, all made viable since the advent of GPS guidance.”

Since BEELINE Technologies pioneered agricultural GPS guidance technology in 1997, it is estimated that 20 to 25 percent of Australian growers have taken up some form of this technology in their operations.

Local growers are finding new and innovative ways to incorporate guidance into their farming activities, irrespective of what they produce.

“Australia really is the market leader when it comes to GPS guidance, we pioneered the technology and we continue to break new ground with its use,” Ross said.

“Growers are being innovative and finding new ways to do tasks more accurately, whilst reducing the labour and time taken to carry out these jobs.

“A prime example of this is the marking out of irrigation for tree crops. With a BEELINE system, areas are being marked out virtually without pegs, something that was unheard of in the past.”

According to Ross, innovation using GPS is occurring on all fronts, from first times users to long term guidance devotees.

“Industries such as cotton, grains and small crops are continuing to move forward and develop new best practices using guidance, whilst other non-traditional industries are starting to use this technology to improve their practices,” Ross said.

“Growers are also planting out olive groves in Victoria using guidance systems, macadamia nut orchards in Queensland and even vineyards in New South Wales.

“We even have South Australian’s using guidance for ripping in lines for reforestation projects.”

With the expansion of the guidance market in Australia, innovation is a trend that is set to continue.



Accuracy - it's not all about GPS

You're using GPS on a daily basis these days to carry out your agricultural operations, but do you really know why BEELINE's GPS systems are so accurate? Do you know about differential GPS and BEELINE's DMU technology? If not, read on and you will learn more about how BEELINE keeps you on the straight and narrow.

Global Positioning System (GPS)

We all know when and why GPS came about (if not see page 2). GPS signal on its own is accurate to about 10 - 20m, which is great if you want to know around about where you are on the planet (which is not very helpful in agricultural applications!).

Differential Global Positioning System (DGPS)

To achieve the accuracies needed for agricultural applications — from one to two meters up to a few centimetres — we need to use a differential correction of the GPS data.

The underlying premise of differential GPS (DGPS) is that any two receivers that are relatively close together (within a few hundred kilometres or so) will experience similar atmospheric errors due to the massive scale of the system. From 20,000 km above the earth what is a few hundred kilometres!

DGPS requires that a GPS receiver be set up on a precisely known location. This GPS receiver is the base or reference station, in our case a BEECON, a similar base station or a correctional signal such as Omnistar (a differential correction signal sent from the Omnistar satellite). The base station receiver calculates its position based on satellite signals and compares this location to its known location.

The difference is applied to the GPS data recorded by the second GPS receiver, which is known as the roving receiver (for example, the GPS receiver on the tractor). The corrected

information can be applied to data from the roving receiver in real time in the field using radio signals. As the base station and the roving receiver are usually less than 10km apart we are able to obtain very high accuracies using DGPS. But wait there is more, what about errors that can creep into our operations that are not caused by GPS signals?

Dynamic Measuring Unit (DMU)

The accuracy and performance of any agricultural GPS steering system is dependent upon a number of variables, namely the GPS signals, the vehicle (i.e. your tractor), the implement being used and the field conditions or terrain.

BEELINE has integrated a Dynamic Measuring Unit (DMU) into their systems to ensure these variables do not limit the accuracy of the system. BEELINE is the pioneer in the use of GPS and DMU technology in agricultural activities and has a patent on its application in this field. The DMU gives real time updates to the steering-assist system 90 times per second.

This allows the system to correct for any errors introduced by the attitude of the tractor as it traverses the field. These errors are introduced by the

terrain & forces that the implement places on the tractor. GPS alone does not update at a fast enough rate to correct for these errors (particularly at speed). This is where integration of the DMU with GPS comes into its own.

The DMU measures and corrects the tractor's movement based on information from 6 axis with a number of built in sensors. A DMU is capable of measuring roll, pitch and yaw, having two sensors on each of the roll, pitch and yaw axes which is why it is referred to as measuring on 6 axis.

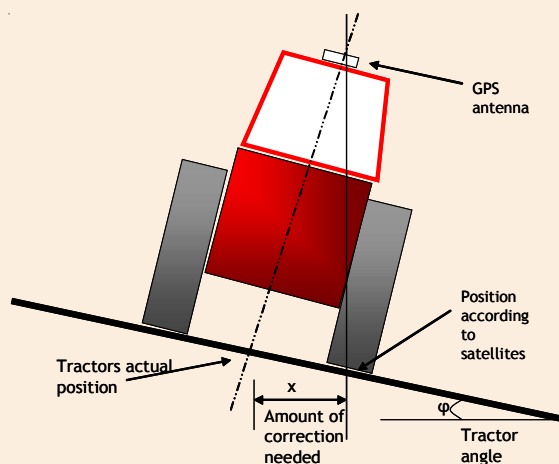
Roll – sideways movements

Pitch – front and rear movement

Yaw – twists through the axis perpendicular to the ground

The DMU measures and corrects for these variables 90 times per second in real time to maintain precise steering control.

Advanced algorithms embedded in BEELINE's system allow this information to be used to continually update tractor heading, compensate for the tractor's roll and pitch, detect the direction of travel and maintain guidance accuracy at a speed of up to 29km/hour.



A diagram of corrections carried out to accurately position a tractor using the DMU

Free Farm Works demonstration software

Agline Distributors are offering current BEELINE users the opportunity to trial the integrated farm management software 'Farm Works' for free.

Farm Works software helps users get more out of their guidance by using their current GPS data to do their own yield and cut and fill mapping, view satellite imagery and manage variable rate application records.

This software can help growers save money on agronomic and surveying costs, while also managing farm accounts in the one seamless solution. Contact your Agline area manager and quote your BEELINE serial number for your free demo CD of this software.

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