



Denis Pozzebon in the field with the radio receiver.

Automation investment delivering water and energy savings

A project investigating the use of automation systems in furrow irrigation in the Burdekin is showing that there are not just labour savings and lifestyle benefits, but also water and energy use efficiencies.

Project details

Key Focus Area

Farming systems and production management

Project name

Modernisation of furrow irrigation in the sugar industry

Project number

2014/079

Chief investigator

Malcolm Gillies

Late nights, early starts, and interruptions to work and social life are all part and parcel of growing irrigated sugarcane in Australia. It's not just labour intensive work, but it also occurs around the clock.

However, a recently completed research project has investigated the use of commercially available technologies that can help make furrow irrigation easier and more efficient – and avoid some of those 3am wake-up calls.

This project has investigated technology to automate furrow irrigation and has worked with three grower collaborators in the Burdekin to ground-truth the technology.

As part of the SRA-funded project, the work was led by Dr Malcolm Gillies with the University of Southern Queensland and the National Centre for Engineering in Agriculture (NCEA), with partnership from Burdekin Productivity Services (BPS) and AgriTech Solutions.

The project began by assessing a range of off the shelf control hardware, sensors and radio systems. The most suitable combination of automation equipment was then selected and automation systems were installed on the three farms. These farms were chosen because they represented three different, but common, types of irrigation infrastructure.

Each of the growers has contributed to the system with his own resources, in addition to the funding provided by SRA.

Dr Gillies said the farmers are using radio equipment and software to control their existing butterfly valves and pumps and monitor the system in real time.

"The growers computer becomes the base station sending instructions to and receiving data from the field radios. All information is stored on farm but growers can choose to control via the internet," he explained.

"Sensors can be used to detect problems in the supply system and let the grower know via text message, or shut the system down automatically if desired."

"Sensors can also be installed at the end of the row to adjust run times and manage tail-water volume."

In June, *CaneConnection* visited the Airville farm of Denis Pozzebon, where he has 118 hectares with multiple pumps, interconnected pipelines and recycling. He sources his water from the Lower Burdekin Water channel, bores and recycle pits, with an underground pipeline allowing him to move water around the whole farm.

"I became involved in this project because I have always had an interest in automation of irrigation and saw that it would be the way of the future," Denis said. "The experience with this project has been a real eye opener and has been everything I have expected, probably more."

"It starts with an improvement to social life by being able to spend more time with family and to be able to travel away and not worry about irrigating this section of the farm. And it has also included savings to water and energy."

The installation cost for Denis was \$60,000 (about \$2210 per hectare) to install (see table of approximate system costs). Denis points out that only part of his farm has been automated and expects that the average cost to decrease as more area is automated.

"It is an investment in the long term that has to be looked at over five to 10 years. It may not stack up in the short term, say two years, but with energy prices skyrocketing every year and water prices going up, I see this as an investment in the future," he said.

The energy and water savings have come with bringing greater precision to the timing of irrigation shifts, which had been on 12 hours before the automation, but Denis said could at times be one or two hours less, as shown precisely by the end of row sensors now installed in these parts of his farm. He said that this had resulted in an estimated 5-10 percent reduction in run-off, delivering water and energy savings.

So far, he has kept a very close eye on things with either his smart phone, tablet or his home computer, where he has the ability to control the valves and pumps to change the irrigation. Moving forward, though, to the 2017 season he said this would now be fully automated.

"This coming 2017 season, when we go to our peak irrigation period in December, I have full confidence I can go away for a full week to New Zealand for a family holiday with no problem that the system is fully automated and reliable. I will still be able to monitor things from over there."

He said there were learning curves, such as determining the volume of water to be measured by the end-of-field sensors to ensure all the rows had cut through.

There had also been early issues with ensuring efficient use of the equipment and avoiding overflows from cylinders if things went wrong. These have now been resolved and he has full confidence in the system.

At Denis's farm, he started with 27ha but he has already set himself the goal of expanding. Dr Gillies said that the system design, equipment required and area per valve is different for each farm, and this affects the cost. For the project sites, the total cost per hectare ranges from \$600/ha at the Upper Haughton site to \$2200/ha at Airville.

"The equipment that has been installed on the project farms is designed to be modular," Dr Gillies said. "That is, different areas can be automated as time and funds permit. It is not necessary to automate the whole farm at one time."

For more information

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Above: Denis Pozzebon checks over the automation system and the wealth of information it puts at his fingertips in his home office.

Keep an eye out for coming SRA email newsletters to see a short video of Denis explaining the project on his farm. In the Spring edition of *CaneConnection*, we talk to growers Aaron Linton and Russell Jordan about their observations and involvement in the project.

System costs (approximate)

Area automated	27 hectares
Total cost	\$59,700
Cost per hectare	\$2,211
Base station, computer & software	\$7,700
Pump controller & installation	\$3,500
Pressure transducer	\$800
Water meter (<i>not required</i>)	N/A
Actuator control radios x 5	\$15,000
Actuators x 8	\$4,000
Actuator brackets & fitting x 8	\$3,200
End of field radios x 5	\$15,000
Advance sensors x 6	\$3,000
Advance sensor installation	\$2,500
System commissioning (<i>costs cover installation of base station and field radios and checking that all are working correctly</i>)	\$5,000