Modernisation of Furrow Irrigation in the Australian Sugar Industry

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Background

Furrow irrigation is a common choice for irrigation of sugar cane across the globe, due to low capital and energy costs. Almost all sugar in the Burdekin area (Australia's largest sugar region) uses this technique.

Although other systems may boast higher efficiencies, furrow irrigation can perform to the same level with appropriate and timely management. Current trends in decreasing labour availability and affordability pose a significant problem for effective irrigation management in Australia.

The Problem

- Water and electricity prices are rising.
- Application efficiencies (AE) range from 30—95%
- Efficiencies can be increased with increased flows and altered times, but means changing sets in the middle of the night.
- Farmers choose irrigation times (12hr, 24hr) which are convenient but may result in poor efficiency

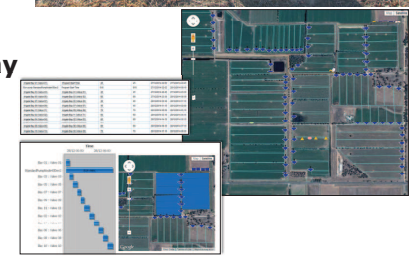
Automation offers a potential solution without any major changes to the on-farm infrastructure.

Project Objectives

- **Review available furrow automation technologies**
- **Establish two demonstration sites for automation**
  - **Comprehensive monitoring of the systems**
  - **Demonstrate potential to growers**
- **Investigate means to employ smart precision irrigation using the automation system**
  - **Plant sensing technologies**
  - **Crop modelling and irrigation scheduling**







Example: Irrigation automation on a Dairy Farm

Why Automate

- **Reduced labour**
- **Reduced energy costs**
- **Reduced water use**
- **Reduced nutrient loss**
- **Improved flexibility:**
  - **Ability to use off peak power**
  - **Irrigate farm in less time though improved efficiency**

Existing systems

Automation systems are currently being adopted by many farmers in the Australian Dairy industry for irrigation of pasture. These systems are not readily suited to sugarcane and lack the ability to adjust to changing field conditions.

Potential Savings

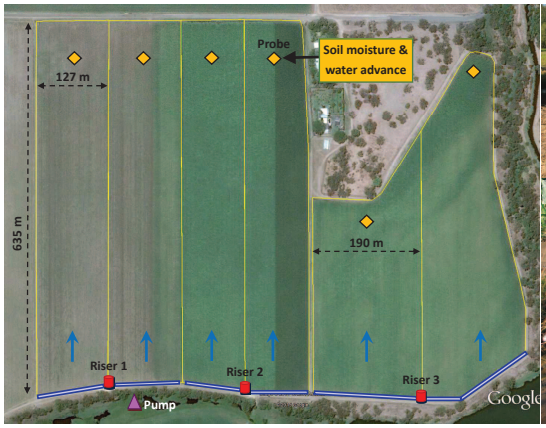
Modelling of historical data has found that potential dollar savings with implementation of smart automation due to water and electricity costs alone range from $100 — $600 per Ha per season.

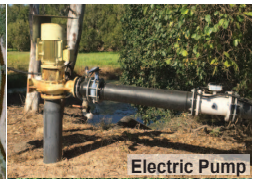
Labour costs are significant vehicle costs to visit fields

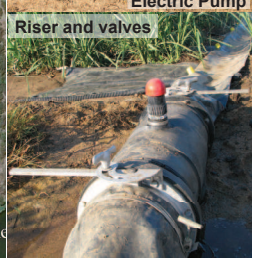
Example Farm—Site 1

Soil moisture deficit = 45mm
Measured: 1.29 L/s for 24hr 49 min = 81.6 mm applied (51.5% AE)
Model optimised to satisfy deficit and 5% runoff:
Optimised: 2.40 L/s for 7hr 20 min = 46.7 mm applied (91.6% AE)
Water saving: up to 34.8mm per irrigation or 7.66 ML/ha per season.
Pumping costs: $15 per ML *(range of $10 — $25)*
Water costs: $30 per ML *(varies according to source and allocation)*

Potential savings: 7.66 ML equates to $344.7 per Ha







Potential field Site No. 1 for automation trial in the Burekin

Completed activities

- **Benchmarking of current irrigation performance**
- **Review of available components and technologies**
- **Preliminary designs completed for 6 candidate farms**

Next Steps

- **Implement automation on two farm sites**
- **Monitor system performance for 2 seasons**
- **Investigate strategies for smart precision irrigation**

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