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# Simplified Irrigation Automation

World Ag Expo

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# Agenda

1. Value of Automation
2. Applications with Power
3. Applications without Power
4. Examples of Automation Equipment
5. Irrigation Scheduling

# Why Automate?

Why Automate? Consider automation when:

- Labor is not available when needed
  - Night and weekend changes
- Labor is unreliable
- Best schedule is not practical manually
  - Many drip schedules need frequent, short durations
  - Cooling or propagation applications especially!
- Labor is better used in higher value activities

# Why Now?

Why Now? Automation has become easier and more affordable:

- Controller and valve technology is extremely reliable and hassle free now.
- Solenoid activated valves are available in a multitude of sizes and configurations
- There are options for applications:
  - With Power and a Low Budget
  - Without Power

# Applications with Power

- Inexpensive and powerful controllers now available with retail prices of less than \$20/station.
- Features:
  - Accommodates up to two 24VAC solenoid activated valves per station
  - Three independent programs
  - Three start times per day on each program
  - A 365 day calendar to simplify scheduling
  - Spanish language labels
  - Weather resistant locking cabinet.

Powerful looping cycle now available

- Allows a valve to run repeatedly throughout a user defined time window for:
  - Seed germination
  - Propagation
  - Evaporative cooling systems.
- Example:
  - A misting system could be operated for 10 seconds every 20 minutes between 10 am and 6 pm each day to maintain high humidity and cool a crop to avoid losses.

# Applications without Power

- Battery/solar/hybrid operated controllers activate valves equipped with DC latching solenoids.
- Features:
  - Three independent programs
  - Eight start times per program
  - A 365-day calendar
  - Large, easy-to-read LCD screen in Spanish or English.
- May be more expensive
- May require periodic changing of batteries
- Extremely powerful and reliable

# Applications without Power

Where to use? Where growers wish to distribute smaller controllers closer to where they are needed.

- Drastically reduces wire costs
- Avoids lightening damage
- Avoids problems from dirty power
- Avoids the need for permits
- Allows easy portability

## Power Details:

- One 6 volt alkaline DC battery or a solar-powered converter.
- Stand alone 6 volt batteries should be replaced each season
- Solar option includes a maintenance-free gel cell battery that boasts a three year life.

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# Examples of equipment

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service



# Irrigation Scheduling

- Scheduling is the decision of when to irrigate, and for how long.
- Decide run time according to plant needs and soil conditions
- Choose when to apply plant needs

# Irrigation Scheduling

First calculate theoretical run time:

## Theoretical Run Time

$$\text{Run Time} = \frac{\text{Crop Water Use}}{\text{Net Application Rate}}$$

Example:

$$\text{Run Time} = \frac{.10"/\text{day}}{.09"/\text{hr}}$$

$$\text{Run Time} = 1.1 \text{ hrs/day}$$

$$\text{Run Time} = 67 \text{ min/day} \quad \leftarrow$$

# Irrigation Scheduling

Then put it together for a schedule:

Day of month	Available Water in crop rootzone at beginning of day, inches	Crop Water Use, inches	Net Rainfall, inches	Net Irrigation, inches	Irrigation duration, hours per day
1	2	0.1	0.0	0.0	0
2	1.9	0.1	0.0	0.0	0
3	1.8	0.1	0.0	0.0	0
4	1.7	0.1	0.0	0.0	0
5	1.6	0.1	0.0	0.0	0
6	1.5	0.1	0.0	<b>0.5</b>	<b>6</b>
7	1.9	0.1	0.0	0.0	0
8	1.8	0.2	0.0	0.0	0
9	1.6	0.2	0.0	<b>0.5</b>	<b>6</b>
10	1.9	0.2	0.0	0.0	0
11	1.7	0.2	0.0	0.0	0
12	1.5	0.2	0.0	<b>0.5</b>	<b>6</b>
13	1.8	0.2	0.0	0.0	0
14	1.6	0.2	0.0	<b>0.5</b>	<b>6</b>
15	1.9				

Loam soil has 2" available water per foot x 1' deep rootzone = 2" available water.

Management allowable depletion is .5"

Net application rate is .09"/hr (tape Q-100 = .34 on 40" bed and 90% uniformity).

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# Irrigation Scheduling



# Summary of Simplified Automation

1. Value of Automation
2. Applications with Power
3. Applications without Power
4. Examples of Automation Equipment
5. Irrigation Scheduling

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# Simplified Automation

**Thank You  
for your  
Attention!**