New Technology for Irrigation System Renovation in Cranberry Bogs

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Irrigation System Goals

1. Apply water at a rate that meets demand to maintain consistent moisture in the pots at all times.
2. Only apply what is needed.
3. Apply the water uniformly over the entire irrigated area.
4. Maintain a consistently high uniformity year after year.

Uniformity is Job #1.

Flow Rate – How much water a sprinkler uses. All sprinklers of the same arc should have the same flow rate.

Radius – How far a sprinkler throws. All sprinklers in a system should throw the same radius.

Nozzle Pressure - Every sprinkler should have the same pressure.

Nozzle Plugging- Nozzle plugging can be a problem. Partial plugging can be hard to identify.

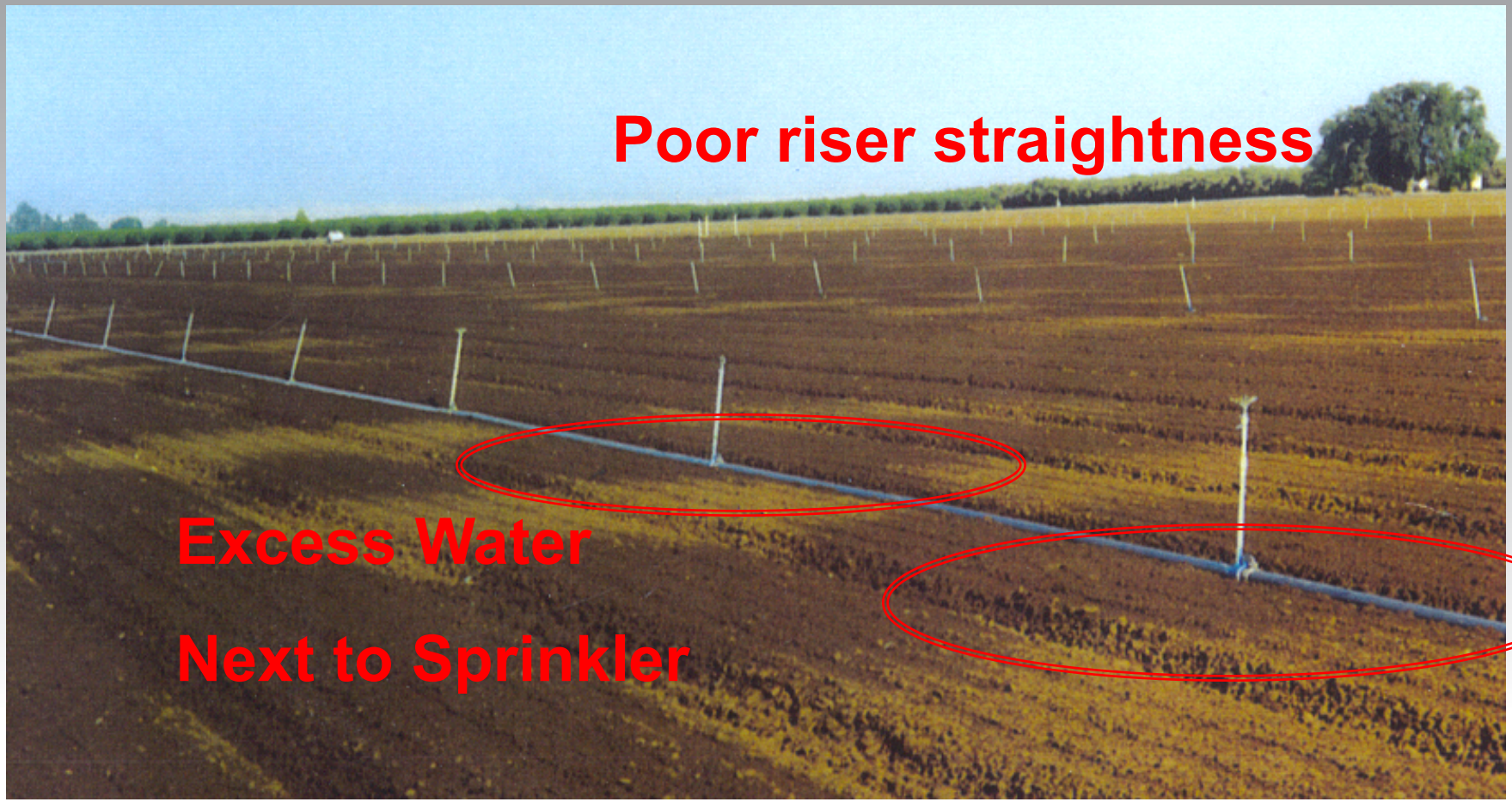
Riser Straightness- This effects the radius and makes it vary around the sprinklers arc.

Wind-Sometimes it works for you, sometimes against, but it always effects uniformity.

Sprinkler Spacing- Tighter sprinkler densities help real world sprinkler uniformities.

Obstructions- Be sure that the sprinklers are high enough.

What Poor Uniformity Looks like



What Poor Uniformity Looks like on a bog

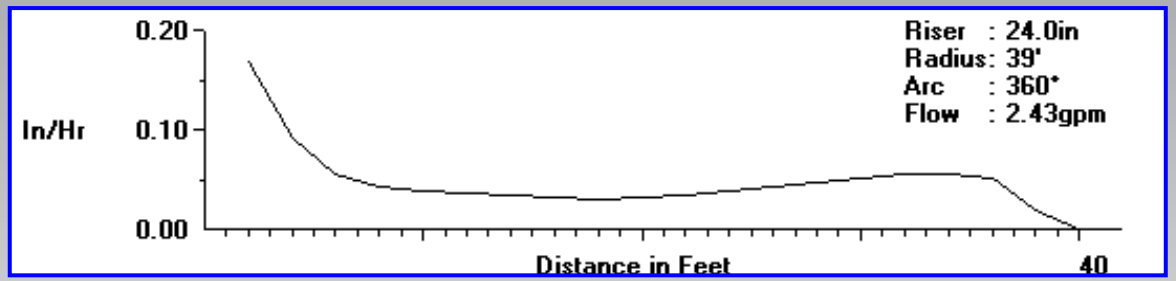
Riser Stability

Impacts

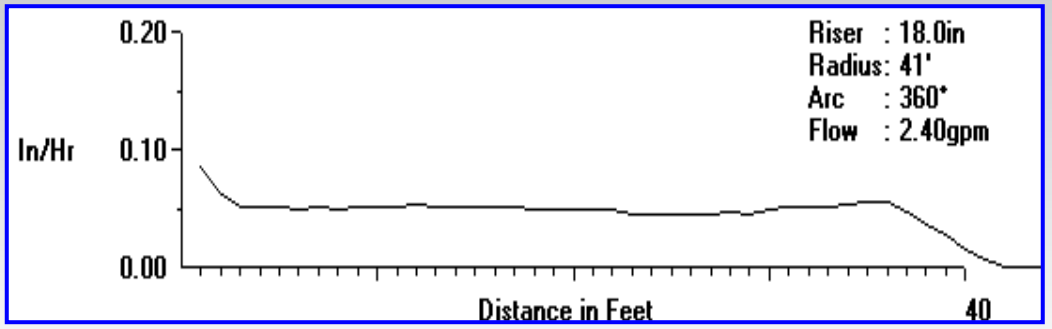
Nelson R2000WF Uniformity

Sprinkler Performance

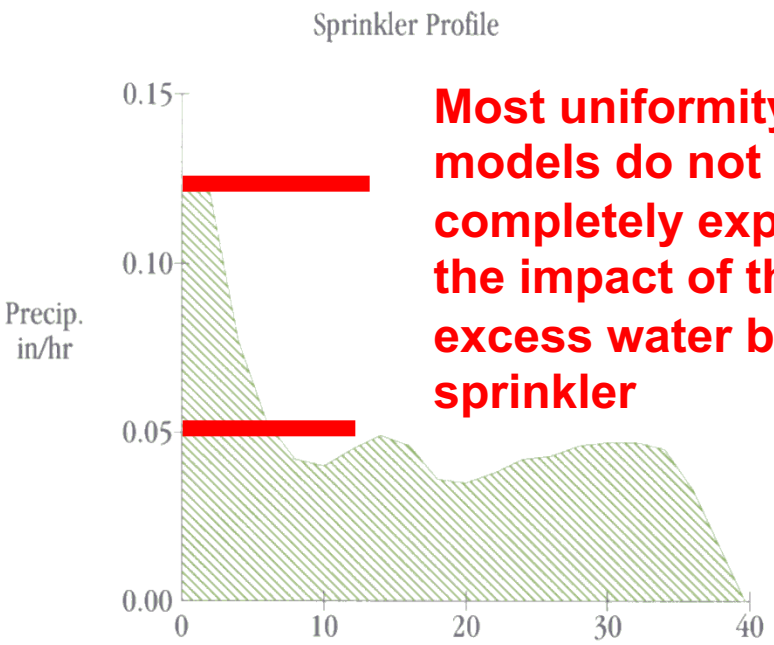
Impacts



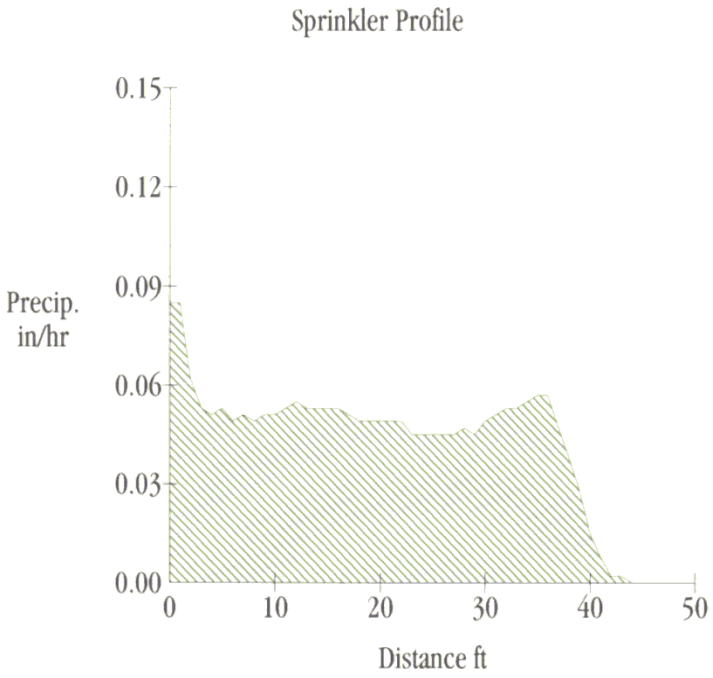
WF Rotator



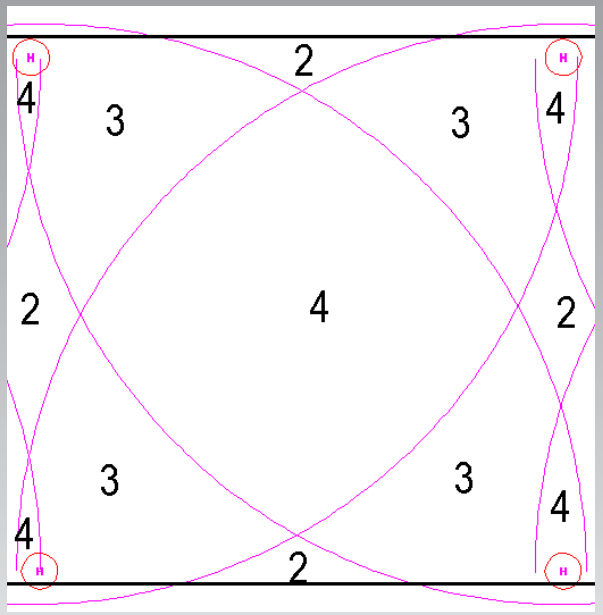
Sprinkler Profiles



Most uniformity models do not completely express the impact of the excess water by the sprinkler

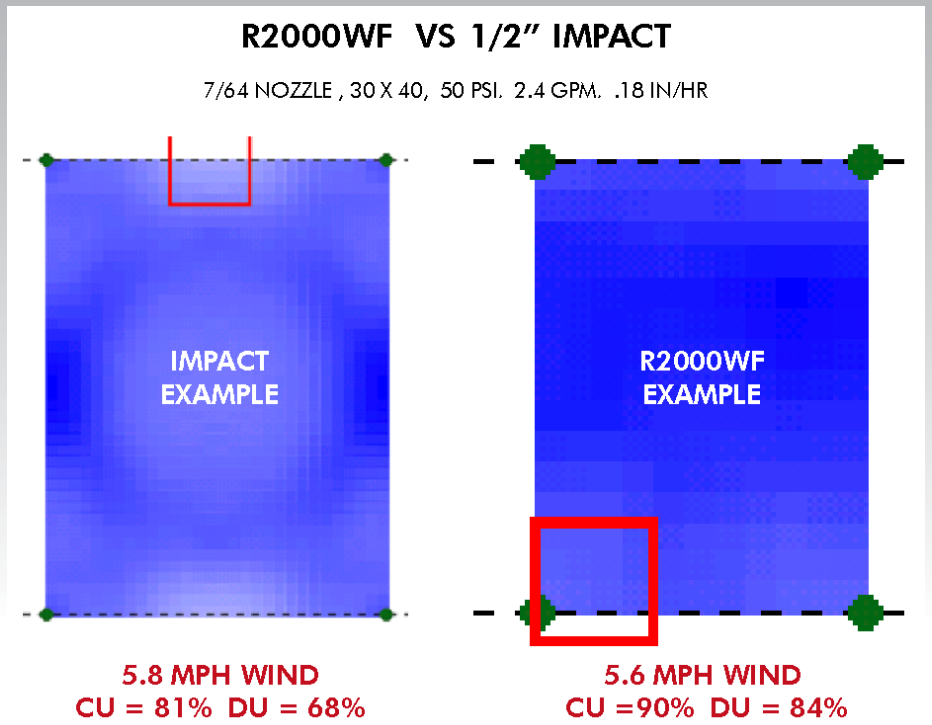


Irrigation Realities



- Round sprinklers in angular patterns force compromise.
- Ag water and piping are not always clean
- Environmental factors like temperature, humidity and wind.
- Input costs

It takes only a slight breeze to make the Windfighter shine!



How's my system doing?

- Check pressure randomly and at farthest point.
- Clean and inspect heads each season
- Check riser straightness and stability
- Run an irrigation audit.
- www.irrigation.org for the Irrigation Association website

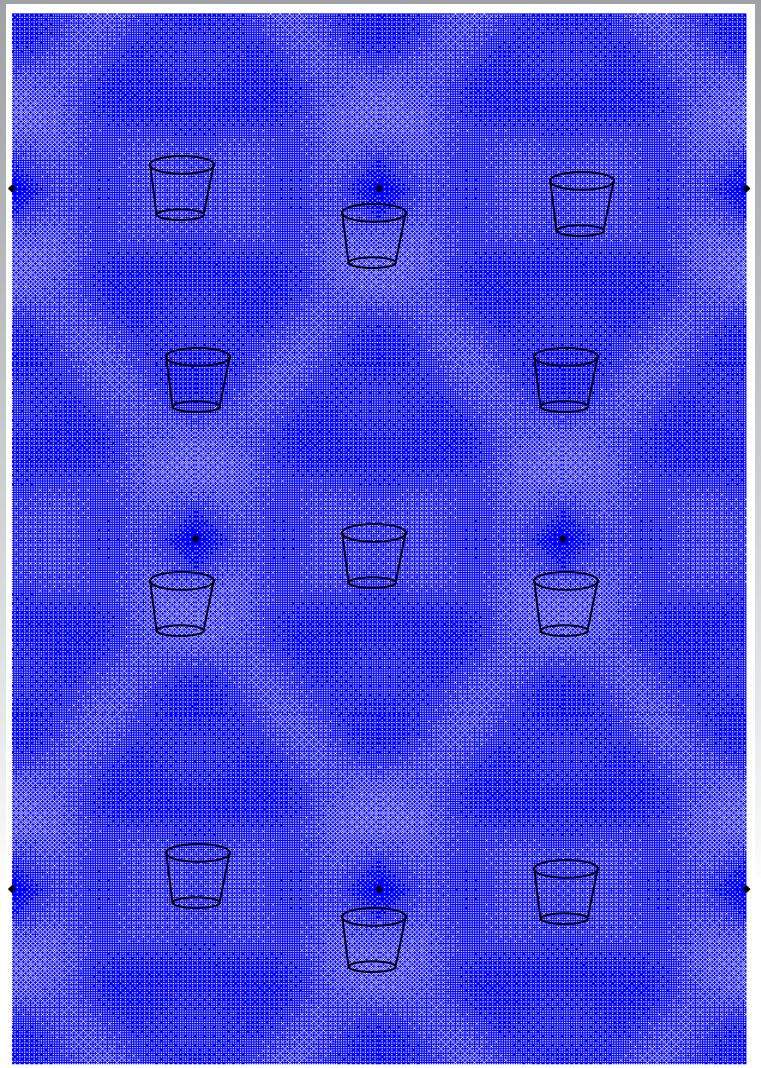
How to improve a system

- Make sure all nozzles are the same size
- Make sure adequate pressure is provided to each sprinkler.
- Are all heads fully operational?
- Filtration Adequate?
- System Automation can be very helpful in system management.

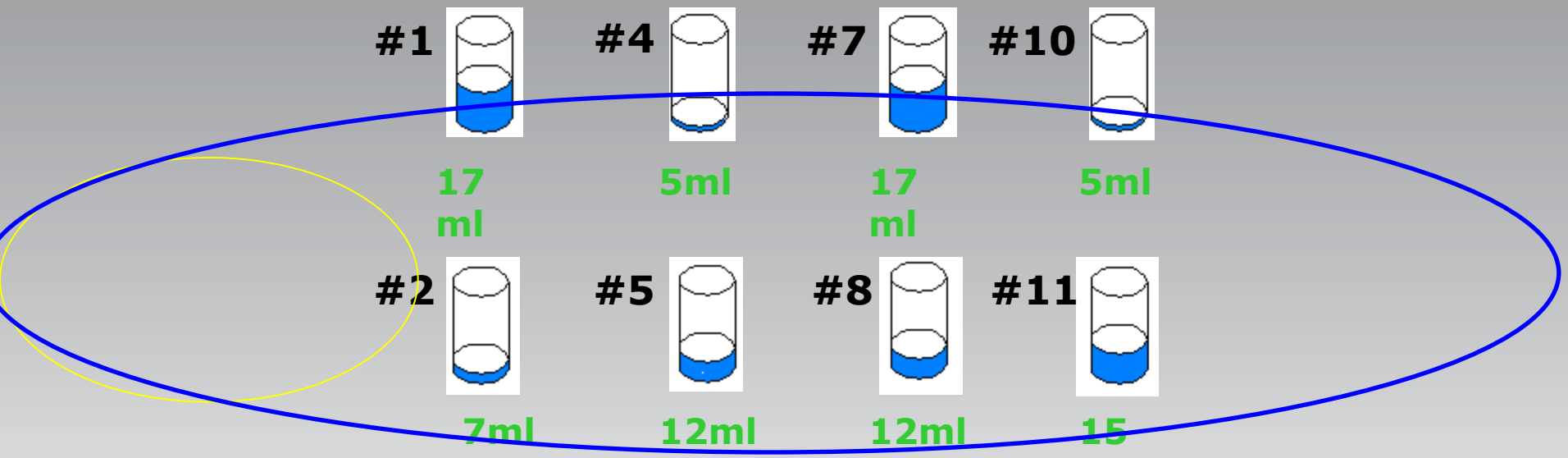
Common Uniformity Measures

- Distribution Uniformity
  - DU
- Christiansen's Coefficient of Uniformity
  - CU

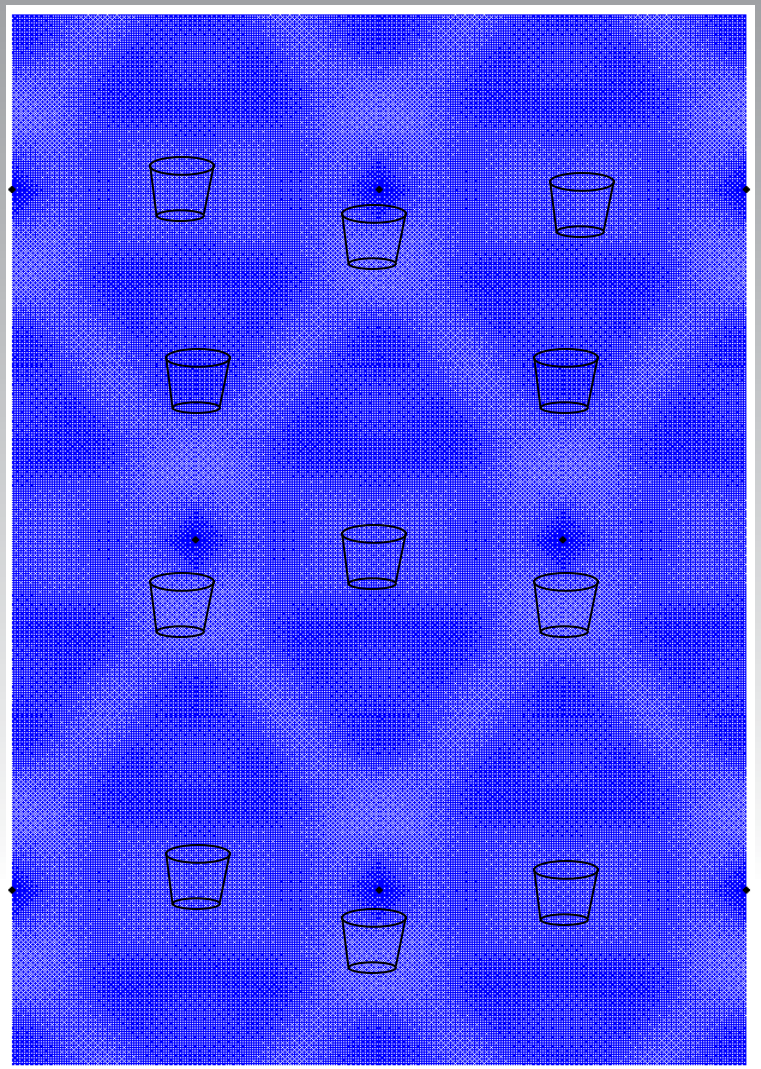
(DU) Distribution Uniformity



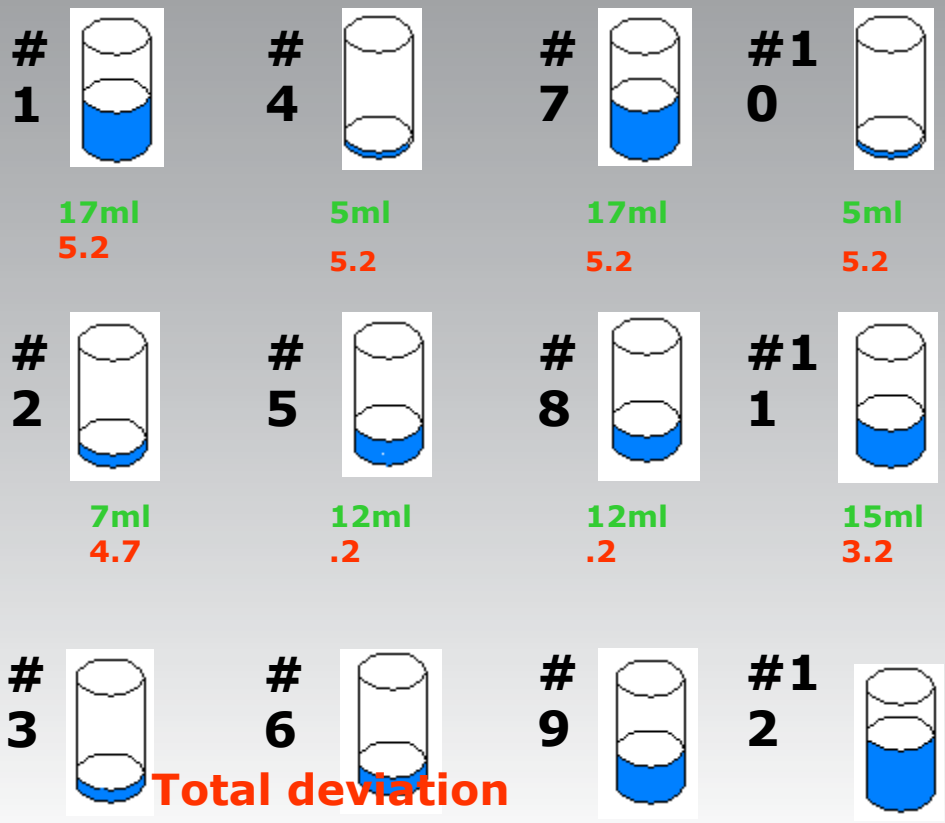
Distribution Uniformity (DU) defined



(CU) Coefficient of Uniformity



Coefficient of Uniformity (CU) defined



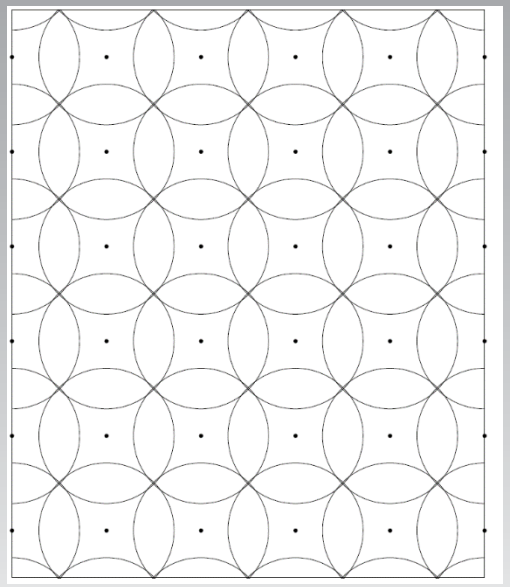
Mean (average) of all catchments 11.8ml

Total deviation From Mean (average) of all Catchments 47.9,ml

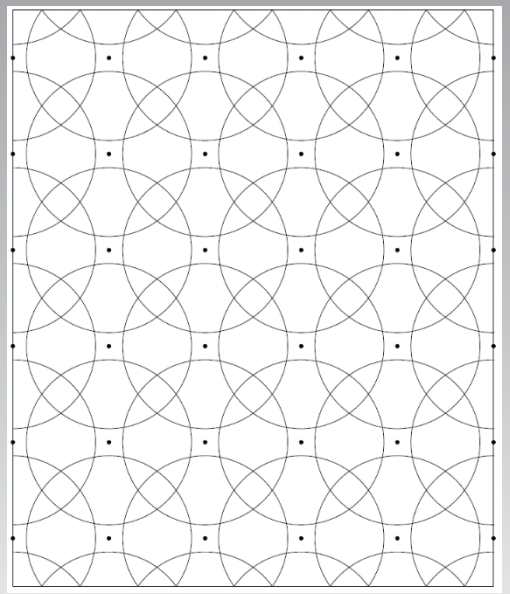
$$100\left(1-\frac{8.2}{\frac{47.9}{11.8 \times 12}}\right) = 66\%CU$$

Sprinkler Density

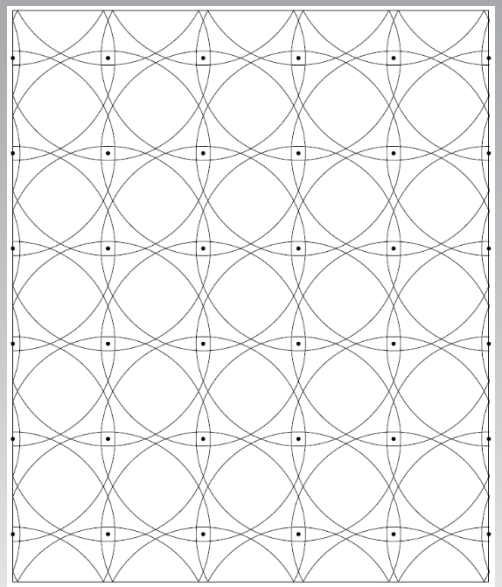
Sprinkler with 5/32nd nozzle at 35psi using 4.18gpm



60’ x 60’
CU 79%
DU 69%



50’ x 50’
CU 81%
DU 75%



40’ x 40’
CU 90%
DU 80%

High Uniformity Saves Water and Power

Assumptions:

- System requires 26 heads (360 deg.)
- 40 psi pressure at heads, 1/8th" nozzle, 2.89gpm
- Irrigation Requirement = .50" water

System A

- 26 x 2.89 = 75.14 gpm
- .17"/hr.= Run time of *176 minutes*
- Total water = 13,224 gals.100%DU

•At 75%DU, need to run 234 minutes to apply .50 to driest 25%.
•This would take 17,582 gals! (+4,358 gals)

System B

- 26 x 2.89 = 75.14 gpm
- .17"/hr.= Run time of *176 minutes*
- Total water = 13,224 gals.100%DU

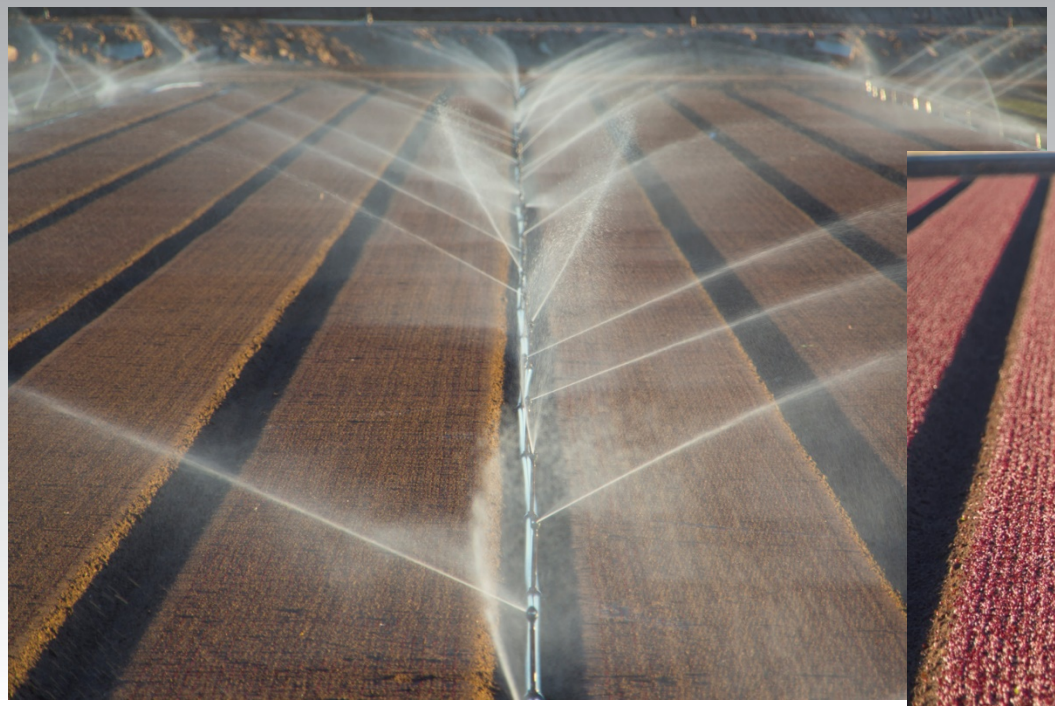
•At 85%DU, needs to run 207 mins. To apply .50 to driest 25%.
•This would take 15,554 gals! (+2,330 gals)

2,028 gallons saved every .50" irrigation per acre!

Every Irrigation.

R2000 WF Sprinkler

Germination Uniformity !



NELSON

R

Rotator® Technology

R2000LP

- **Overhead Cooling and Frost protection**
  2.5 Timers Faster Rotation Speed than R2000WF (20 to 50 seconds)
- **Lower pressure applications between 25 and 40 PSI**

Compared to R2000:

- **Greater Distance of Throw**
- **Faster Rotation Speed**

R2000LP Uniformity is Excellent!

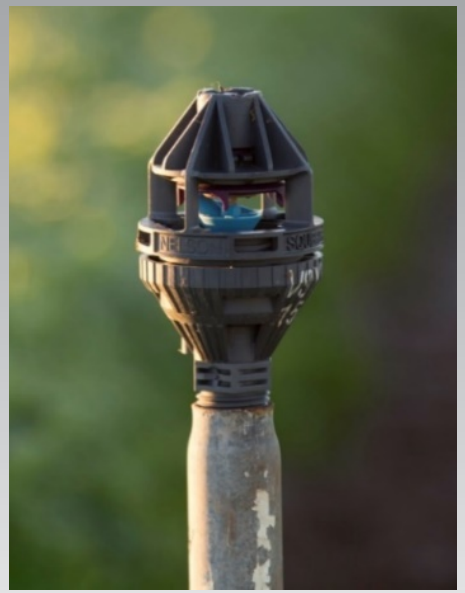
Run	Rec. #	Model	Nozzle	Traj (°)	Pressure (psi)	Riser Ht (in)	Layout	Spacing (ft) Head x Row	Offset (ft)	Olap (%)	CU (%)	DU (%)	SC 95	Precip. Rate (in/hr) Mean	Min	Max
1	4117-N1	WF14	#14 Green	25	35.00	18.00	Rect	38.00 x 42.00		69	93.2	88.4	1.2 (2)	0.09	0.07	0.10
2	4117-N1	WF14	#14 Green	25	35.00	18.00	Tria	38.00 x 42.00	19.00	72	92.0	87.2	1.2 (2)	0.09	0.07	0.11
3	4116-N1	WF14	#13 Yellow	25	35.00	18.00	Rect	38.00 x 42.00		71	86.9	79.0	1.4 (1)	0.07	0.05	0.10
4	4116-N1	WF14	#13 Yellow	25	35.00	18.00	Tria	38.00 x 42.00	19.00	75	90.7	84.6	1.3 (2)	0.07	0.05	0.09
5	4114-N1	WF12	#11 2TN Ora	25	35.00	18.00	Rect	38.00 x 42.00		62	87.0	82.5	1.2 (5)	0.05	0.04	0.08
7	4115-N1	WF12	#12 2TN Pur	25	35.00	54.00	Rect	38.00 x 42.00		70	93.0	88.0	1.2 (2)	0.06	0.04	0.07
8	4115-N1	WF12	#12 2TN Pur	25	35.00	54.00	Tria	38.00 x 42.00	19.00	73	90.8	84.1	1.3 (2)	0.06	0.04	0.07
9	4118-N1	WF12	#10 2TN Dar	25	35.00	18.00	Rect	38.00 x 42.00		58	86.9	79.2	1.2 (4)	0.05	0.03	0.07
11	4119-N1	WF16	#15 2TN Tan	25	35.00	18.00	Rect	38.00 x 42.00		73	90.2	86.7	1.2 (1)	0.13	0.10	0.19
12	4119-N1	WF16	#15 2TN Tan	25	35.00	18.00	Tria	38.00 x 42.00	19.00	76	93.0	90.1	1.1 (4)	0.13	0.11	0.16

R2000LP Uniformity is Excellent!
Outdoor Wind Tests

Sprinkler	Model	Nozzle	Plate	Radius	Traj	Pressure	RiserHt	Layout	Spacing	Offset	PcentOlap	CU	DU	SC	FlowRate	Theoretical App Rate	WndSpd
ROTATOR	R2000LP	#16 Red	Red	33.12	25	45	14	Triangular	38x42	19	76.33	93	87	1.29	3.07	0.19	0.25
ROTATOR	R2000LP	#14 Green	Green	31.25	25	35	18	Rectangular	38x42	0	68.61	92	86	1.28	2	0.12	0.7
ROTATOR	R2000LP	#15 Tan	Red	33.12	25	35	18	Triangular	38x42	19	76.33	92	89	1.19	2.35	0.14	0.3
ROTATOR	R2000LP	#14 Green	Green	30	25	35	36	Rectangular	38x42	0	65.87	91	85	1.3	2	0.12	4.1
ROTATOR	R2000LP	#16 Red	Red	33.12	25	45	14	Rectangular	38x42	0	72.73	91	86	1.38	3.07	0.19	0.25
ROTATOR	R2000LP	#14 Green	Green	31.25	25	35	18	Triangular	38x42	19	72.01	90	85	1.24	2	0.12	0.7
ROTATOR	R2000LP	#16 Red	Red	30	25	35	17	Rectangular	38x42	0	65.87	86	77	1.55	2.7	0.16	7.11
ROTATOR	R2000LP	#13 Yellow	Green	32.5	25	35	18	Rectangular	38x42	0	71.36	85	77	1.44	1.78	0.11	1.7
ROTATOR	R2000LP	#11 Orange	Purple	28.12	25	35	18	Triangular	38x42	19	64.81	85	77	1.56	1.27	0.08	0.25
ROTATOR	R2000LP	#16 Red	Red	30	25	35	17	Triangular	38x42	19	69.13	84	73	1.65	2.7	0.16	7.11
ROTATOR	R2000LP	#15 Tan	Red	29.38	25	40	17	Rectangular	38x42	0	64.49	83	73	1.53	2.53	0.15	8.06
ROTATOR	R2000LP	#15 Tan	Red	29.38	25	40	17	Triangular	38x42	19	67.69	81	72	1.48	2.53	0.15	8.06

Maintenance and Reparability

Repair Tool



Accessories

Flush Tool

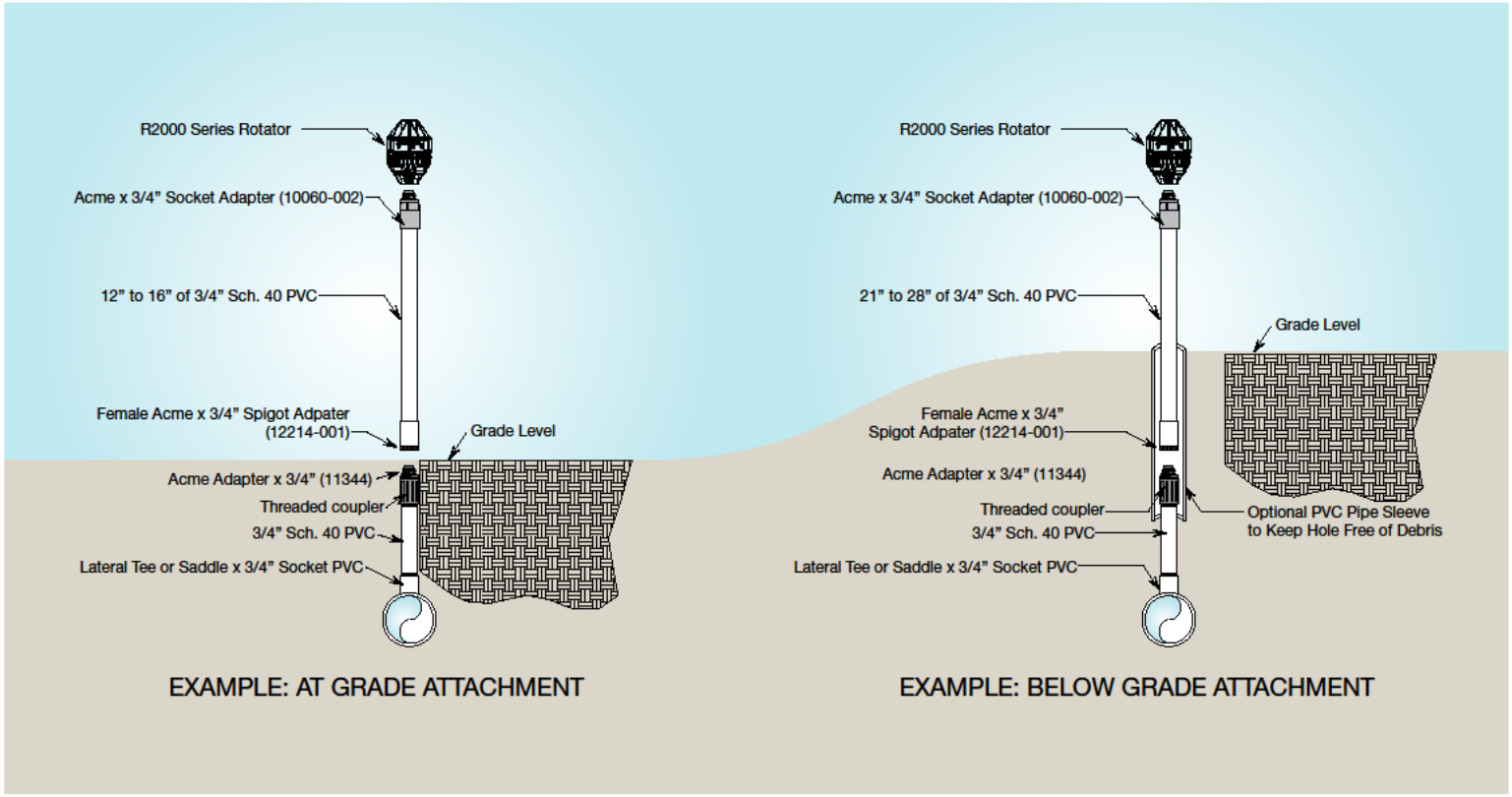
Cap Removal Tool

Repair Tool

Acme Cap

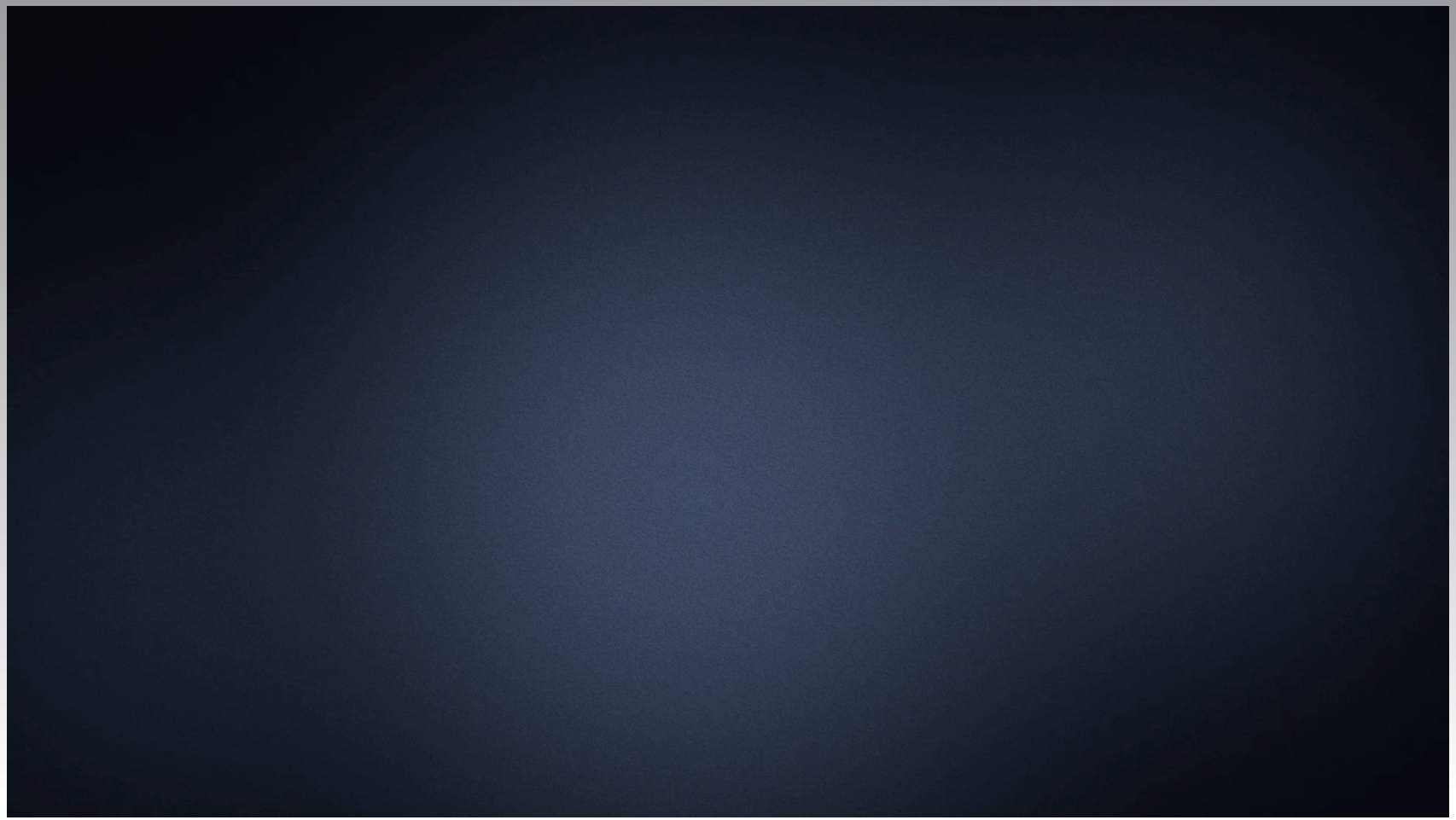
Pressure Gauge tap assembly

Detachable Riser Assemblies



Large ¾” Detachable Riser Fittings

1000 Series Control Valve



TWIG™

Rotator® Technology

nelsonirrigation.com

REASONS TO AUTOMATE

- Save Labor
- Shorter Sets
- Cycle & Soak
- Rapid Cycling
- Improve application rate
- Precision Irrigation

NELSON REASONS TO AUTOMATE... *WIRELESSLY*

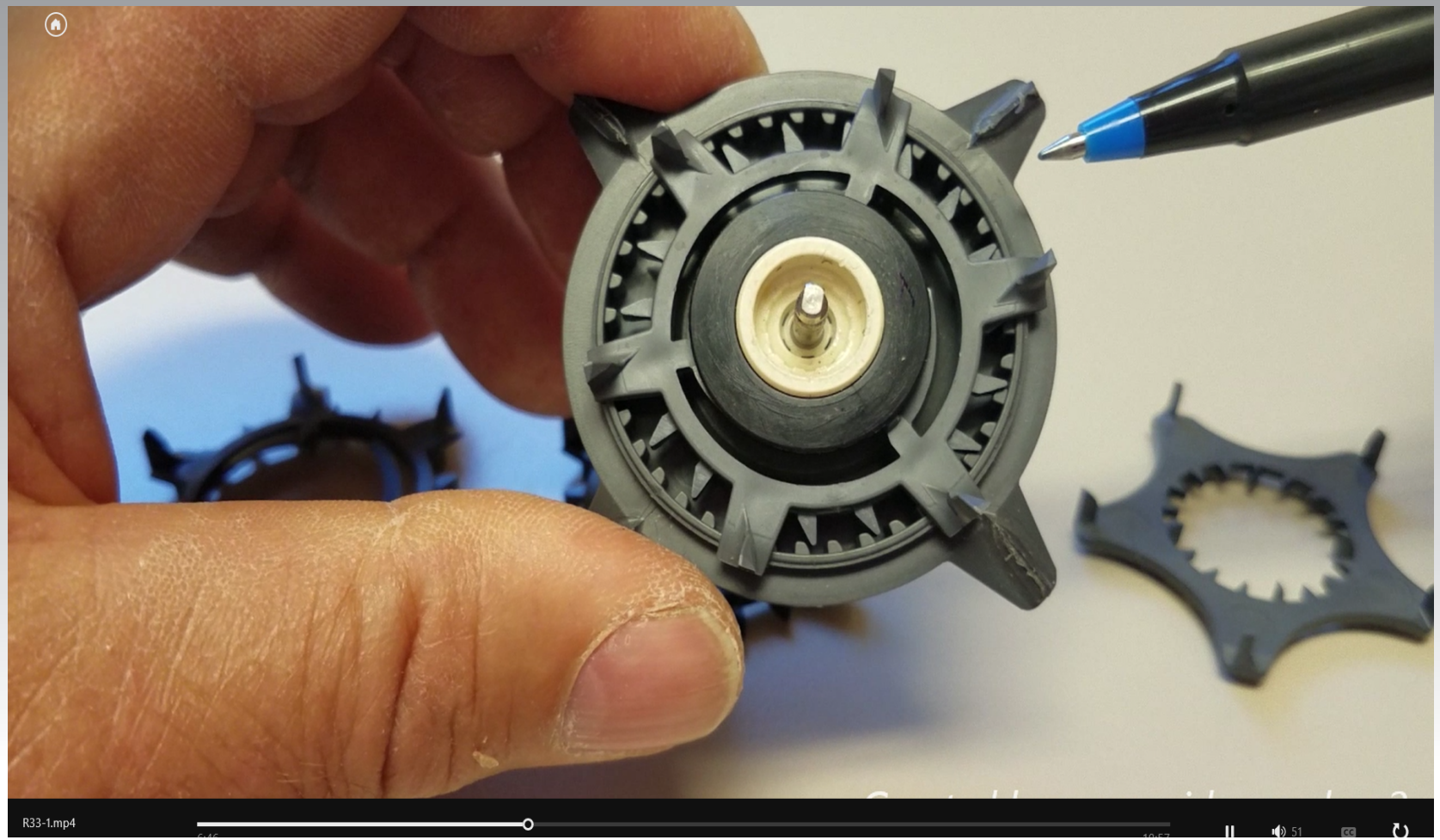
- Reduce Installation Costs
- Reduce Maintenance
- Less Susceptible to Lightning
- Easy to expand
- Operate more valves

TWIG™

- "Farm-tough" units
- Internal antennas
- Low-power design
- Reliable two-way communication

Products in development

- Improvements to the R33
- R33NV
- SOAR
- Expansion of the TWIG Control Line



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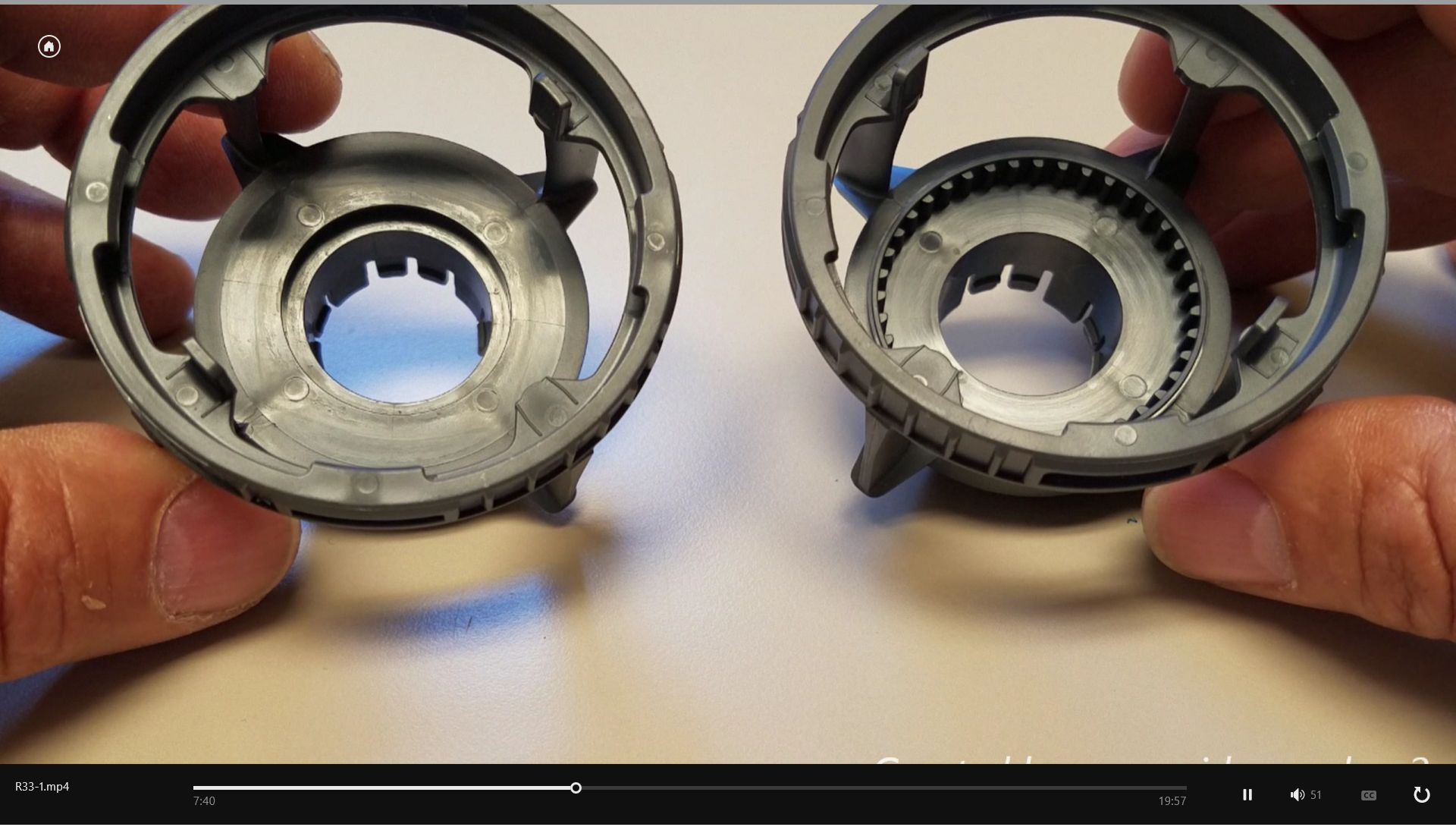
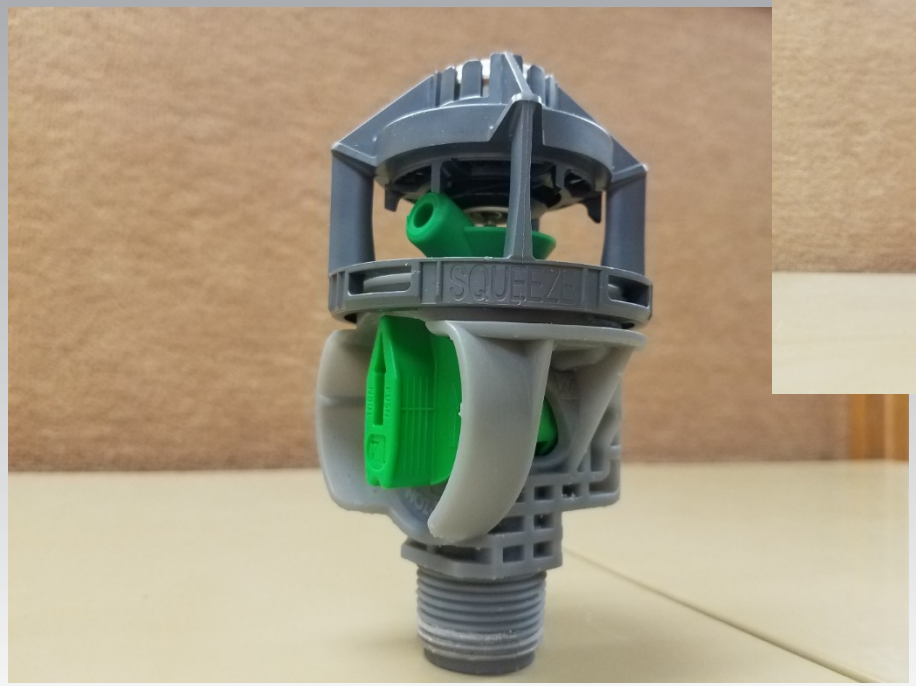


Rotator® Technology

Rotator® Technology

NELSON R33NV



Rotator® Technology

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TWIG Wireless -- Remote

Integration Expands Capacity

Irrinet LLC

PROBE SCHEDULE®

Irrigation Water Management software

MEASURETEK
IS MOVING
the Ag industry into a
NEW ERA OF
PRECISION FARMING

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Thank You!

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