TOPICS WE WILL COVER

- Importance of Design
  - Head to head coverage
  - Matched precipitation rates
  - Pressure regulation

- Rain Bird Commercial Rotor Product Lines
  - 3500
  - 5000 & 5000+
  - 6504 (Falcon)
  - 8005

- Tools
- Water saving resources
**PRECIPITATION RATES**

- **Precipitation Rate** = The speed at which an individual irrigation nozzle or irrigation system applies water. Measured in inches per hour (in/hr) in the United States.

  **Square Spacing**
  - U.S.: Precipitation Rate (PR) = \( 96.6 \times \frac{5}{5} \times \frac{5}{5} \) gpm
  - Metric: Precipitation Rate (PR) = \( 1000 \times \frac{5}{5} \times \frac{5}{5} \) cm/h

  **Triangular Spacing**
  - U.S.: Precipitation Rate (PR) = \( 96.6 \times \frac{5}{5} \times \frac{5}{5} \) gpm
  - Metric: Precipitation Rate (PR) = \( 1000 \times \frac{5}{5} \times \frac{5}{5} \) cm/h

- **Considering precipitation rates in an irrigation system helps:**
  - Eliminate run off
  - Apply only the needed amount of water
  - Maximize plant health
  - Avoid wet and dry spots
  - Minimize water waste
  - Reduce system cost

**PRECIPITATION RATES**

- **Distribution Uniformity (DU)** = A measure of how evenly water is applied to an area. A perfect distribution uniformity (DU) would be 100%.
  - DU is a measure of efficiency. Precipitation rate is only the average rate of application.

- **Scheduling Coefficient (SC)** = Calculated from a denso-gram or catch can test. This measure finds the dry spot and delivers a multiplier for irrigation run time that will provide adequate water to the driest section of the coverage area.
PRECIPITATION RATES

Watering to the weak spot – How precipitation rates impact distribution uniformity and scheduling coefficients...

- Individual component precipitation rates vs. zone or system precipitation rates
  - When an individual component’s precipitation rate is published by a manufacturer it refers to the performance of that specific component.
  - A zone or system precipitation rate must be calculated for the average precipitation rate over the entire irrigated area. This can be done by using the Total Area Method.

Matching Precipitation Rates
- It is important to match as closely as possible precipitation rates of individual components in a zone or system. This helps to maximize the DU and SC of the individual components in a system and minimize water waste.

How is Matched Precipitation Rate (MPR) Achieved?
- When irrigating with rotors, select nozzles that best maintain similar precipitation rates across both arc and radii or choose specific MPR nozzle sets.

Matching Spray and Rotary Nozzle Precipitation Rates in Individual Components to Build an MPR System
- Rain Bird makes this easy by providing three nozzle sets (MPR, U-Series, and Rotary Nozzles) that have matched precipitation across all arcs and radii. We take the work out of choosing the right nozzle, just install for the proper arc and radii.

Matching Rotor Precipitation Rates in Individual Components to Build an MPR System
- This is a little more complicated. Since rotors arcs are adjustable, one nozzle will deliver significantly different precipitation rates depending on the area of coverage.
Matching Rotor Precipitation Rates in Individual Components to Build an MPR System (cont.)

- Common rotor installation methods
  - Same Nozzle for all Rotors — “I just use the same nozzle in all rotors because it saves time and keeps the radius the same.” — This method works great if all rotors with similar arc settings are zoned together. But that is not common practice.
  - Select Nozzles to Deliver Right MPR — “If I have a 3 GPM nozzle in the corner (90 degrees), I’ll use a 6 GPM nozzle on the sides (180 degrees).” — This is the most common practice. Rotors are not zoned by arc, but are grouped together by area. To achieve best MPR, nozzles are installed per the diagram below.

  Remember PR is measured in “inches per hour”
  6 GPM is double the flow of 3 GPM. The 6 GPM nozzle covers twice the area of the 3 GPM nozzle. This achieves MPR right? Not exactly. The 6 GPM nozzle will have a larger radius of throw and greater area of coverage giving it a lower PR.

Great time to mention…
- MPR Nozzle sets for the 5000 Series Rotors
  - Recognized by the American Society of Agricultural Engineers (ASAE) for engineering excellence with a prestigious AE50 award.
  - Match both Precipitation Rate AND radius
  - As simple as installing spray nozzles!

3 Sets of Nozzles for 25', 30' and 35'
provide both MPR of 0.6 in/hr and matched radius.

This is the same precipitation rate as Rotary Nozzles delivering true 0.6 in/hr MPR from 13 to 35’

How much water can matching precipitation rates save? Let’s look at three examples.

All calculations use 9 x 5000 Series rotors on one irrigation zone, operating at 45 psi, spaced 35' apart in a 3 x 3 grid.

Installation 1 - All 3 GPM nozzles spaced 35'N between
Installation 2 - 1.5 GPM nozzles in corners, 3 GPM nozzle on sides, and 6 GPM nozzle in center
Installation 3 - 35’ Series MPR nozzles in all rotors
Assume all SC and DU is perfect and the same for all nozzles then isolate precipitation rate as the only variable. Consider a weekly watering need of 2.1 inches...

- **Installation 1** - All 3 GPM nozzles spaced 35 feet apart
  - To deliver 2.1 inches of irrigation a week to all areas of turf the zone would consume 204 gallons of water

- **Installation 2** - 1.5 GPM nozzles in corners, 3 GPM nozzles on sides, and 5 GPM nozzle in center
  - To deliver 2.1 inches of irrigation to all areas of turf the zone would consume 156 gallons of water (Savings vs. Installation 1 = 24%)

- **Installation 3** - 35' Series MPR Nozzles in all rotors
  - To deliver 2.1 inches of irrigation to all areas of turf the zone would consume 135 gallons of water (Savings vs. Installation 1 = 34%, Savings vs. Installation 2 = 13%)

**Conclusion**
- When isolating precipitation rates as the only variable in an irrigation system it is clear that choosing MPR individual components in a zone or system can have a tremendous impact on reducing water waste and maximizing efficiency.
- Combining the selection of MPR products with a properly designed system, high DU, and low SC products results in a system that performs evenly and efficiently resulting in less water consumption.

**PRESSURE REGULATION**
PRESSURE REGULATION

- Regulation vs. Compensation
  - Pressure Regulation: Maintaining a constant and preset desired outlet pressure regardless of inlet pressure or pressure fluctuations when inlet pressure exceeds threshold of pressure regulating device.
  - Pressure Compensation: Predictably reducing outlet pressure relative to inlet pressure where final outlet pressure is subject to variability determined both by compensating device and inlet pressure.

In irrigation systems, pressure is mainly regulated for the following reasons:

1. To reduce supply line pressure to be within manufacturers recommended operating pressure for downstream components
2. To reduce water waste caused by high pressure operation and ensure nozzles operate at maximum efficiency
3. To make certain that calculated design hydraulics are being achieved in the field and irrigation devices are operating to manufacturer provided radius, flow, and precipitation rates
4. Accommodate pressure fluctuations of water supply
Rain Bird pressure regulating solutions:

- At the valve pressure regulation = PRS Dial
  - The PRS-Dial is an excellent means of regulating outlet pressure from 15 to 100 psi at the valve regardless of incoming pressure fluctuations. The visible scale makes installation quick and easy.

Rain Bird pressure regulating solutions:

- At the rotor pressure regulation = Pressure regulating swing joints
  - The Rain Bird Turf Swing Joint with Pressure Regulating System (TSJ-PRS) controls and maintains a preset inlet pressure for rotors with 3/4” (45 psi) and 1” (70 psi) inlets.

Rain Bird pressure regulating solutions:

- In-stem pressure regulation = Pre-installed pressure regulating devices
  - Rain Bird offers these products with pre-installed in-stem pressure regulation:
    - 1800 Series Sprays (30 psi for spray nozzles – MPR, VAN, and U-Series)
    - 45 psi 1800 Series Sprays (45 psi for Rotary Nozzles)
    - 5000 PRS Series Rotors – The ONLY rotor that provides 45 psi pressure regulation in-stem.
Rain Bird Rotor Naming Conventions

- What is the maximum range for an 5004?
  A) 42 ft
  B) 50 ft
  C) 35 ft
  D) 80 ft

  Answer: B: The 5004 with a # 8 nozzle throws 50 ft with 55 PSI

- What is the pop up height on an 8005?
  A) 12 in
  B) 6 in
  C) 4 in
  D) 5 in

  Answer: D

- 4 Digit code
  - First two = Range
  - Last two = Height

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3504

1. Remove Nozzle Tree from rotor
2. Select desired nozzle
3. Lift up Stem
4. Insert nozzle (press firmly until nozzle seats)
5. Turn radius reduction screw to retain nozzle
6. Setting the arc: Arc is adjustable from 40 to 360 degrees with a fixed LEFT edge
7. Adjust radius reduction screw to attain desired radius. (up to 35% reduction)

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5000 & 5000+

1. Insert tool into pull-up slot, turn 90 degrees and lift up stem.
2. Insert the desired nozzle and turn the radius adjustment screw to secure the nozzle
3. Insert the nozzle identification plug
4. Set the arc: Arc is adjustable from 40-360 degrees with a fixed left edge
5. Adjust radius reduction screw to attain desired radius. (up to 25% reduction)
6. 5000 Plus Flow shut off feature: With a flat headed screwdriver turn 180 degrees clockwise to turn off flow. Turn counterclockwise to start the flow.
**5000 & 5000+**

1. Matched Precipitation Rate
   Nozzles available in 25 ft, 30ft and 35ft radii, with Full, Half, Third and Quarter nozzles.

2. PRS: Pressure Regulating Stem
   Available

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**6504**

1. Insert tool into pull-up slot, turn 90 degrees and lift up stem.
2. Ensure the nozzle retainer screw is not blocking nozzle insertion.
3. Insert the desired nozzle using both thumbs. Ensure it is fully seated. Tighten the nozzle retainer screw.
4. Nozzle retainer screw can be used to reduce radius by up to 25%.
5. Set the arc: Arc is adjustable from 40-360 degrees with a fixed left edge.
6. Each full turn will adjust the arc by 45 degrees.

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**5505**

1. Insert tool into pull-up slot, turn 90 degrees and lift up stem.
2. Ensure the nozzle retainer screw is not blocking nozzle insertion.
3. Insert the desired nozzle using both thumbs. Ensure it is fully seated. Tighten the nozzle retainer screw.
4. Nozzle retainer screw can be used to reduce radius by up to 25%.
5. Set the arc: Arc is adjustable from 40-360 degrees.
6. Each full turn will adjust the arc by 45 degrees.

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**PRS: Pressure Regulating Stem**

- Available Arc Adjustment Slot
- Flow Shut-Off Slot
- Pull-up Slot
1. Insert tool into pull-up slot, turn 90 degrees and lift up stem.
2. Ensure the nozzle retainer screw is not blocking nozzle insertion.
3. Insert the desired nozzle using both thumbs. Ensure it is fully seated. Tighten the nozzle retainer screw.
4. Select full circle or part circle mode.
5. For part-circle Arc is adjustable on left and right sides from 50-360 degrees.
6. Left and Right trip can be felt and heard. Due to the memory arc this can be subtle. Verify trip point during normal operation.

QUESTIONS?

RESOURCES
- The Intelligent Use of Water™
  - Learn more about Rain Bird and our commitment to the Intelligent Use of Water™
- Rain Bird water saving calculators
  - These calculators help estimate water savings, cost savings, and payback of installing PRS devices
- Rain Bird catalog Rotor Section
  - This is a link to the rotor section of our catalog
- Rain Bird para los hispano hablantes
  - Tenemos un catálogo en español en Internet