SPRAY HEAD AND ROTOR MAINTENANCE/TROUBLESHOOTING

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Of the problems that can occur in an irrigation system, those associated with sprinkler heads are the most noticeable to clients and the public. They result is such visual conditions as non-uniform show of green turf (donut patterns and dry spots), ponding water; and misting and drifting which causes wet sidewalks and streets.

Today's modern sprinkler systems include two types of heads: spray and rotary. The type of head used will depend on the dimensions of the area being irrigated, water pressure available for operation, and a variety of other factors.

SPRAY HEADS

Spray heads are most commonly thought of when one thinks of irrigation. These types of heads are uniformly spaced within an area and are used to irrigation lawns, shrubs, and ground cover beds. The main difference between spray heads and other types of heads is in their spacing. Although the spacing of spray heads can vary, depending upon the specific nozzle selected for use in the head, they are usually not spaced more than 15 feet apart. The majority of spray heads are pop-up's where the nozzle in located on the tip of a riser that is design to pop up anywhere from two inches to 12 inches out of the housing of the head during operation. After watering, the riser retracts to the soil line to allow mowing, normal use of the lawn, and to be out of sight. The six and 12-inch pop-ups are called high pop-ups and are used in shrub, groundcover and flowerbeds. Spray heads can also be installed in planting beds on fixed risers that do not pop up. The height of the riser is base on the projected height of the shrubs and plants and is a means to provide uniform application of water.

ROTARY HEADS

Rotary heads are larger and are used to irrigate larger areas than spray heads, including large lawns and sports fields. They can project water a distance of 20 to 50 feet or more. Like sprays, these heads are available as pop-ups and fixed versions on risers. There are two types of rotary sprinklers, gear-driven and impact. The difference between them is in the mechanism that allows them to rotation.

Impact Rotors: Impact heads were originally developed for watering agricultural crops in the 1930's and have been used in landscape irrigation since the 1940's. The main component of the impact head that allows it to rotate is a spring-loaded arm. As water flows from the outlet in the head, it causes the arm to pivot away from the water stream until it hits a stopper attached to the head assembly. The spring causes tension in the arm, which then returns the arm to its original position, and the process starts again. The impact against the stopper causes the entire assembly, including the stream of water, to rotate slowly. The slow, continuous rotation of the assembly will slowly water the area covered.

Impact heads can irrigate a full or part circle area. A lip or spring can be switched to reverse the rotation and cause the assembly to move backwards before it completes a full circle of revolution. For part-circle sprinklers, this back and forth rotation allows the head to be used in areas like corners and along curbs and walks.

Many think that the coverage provided by impact type rotors is more uniform than that of any other type of head. Whether this is true now is overshadowed by the fact that they can be high maintenance. As an impact sprinkler is activated, it rises out of the head casing, exposing the open housing of the head. This open cavity is prone to catching mud, grass clippings and other debris. Frequent maintenance is required to keep housing and mechanisms clean, especially to prevent damage to the assembly. Impact rotors also have many exposed, moving parts. The springs can be especially troublesome because clippings and twigs can become entangled in

them. The springs can also be easily bent, fall off the assembly, or rust. Another negative characteristic is their clatter during operation, which can be annoying.

Gear-driven Rotors: Gear-driven rotary sprinklers are used in most modern systems and are the most popular type of rotary head. Water turns a small turbine in the base of the unit, which drives a series of gears that cause the head to rotate. Unlike impact sprinklers, the drive mechanism is sealed from dirt and debris, is quiet during operation, and easy to adjust. However, because of their long throw of water, they can be misused and misapplied. Although gear rotors cost more than spray heads, their wider spacing capability means fewer heads are needed to cover a given area. Consequently, they are frequently used in spaces too small for efficient rotor operation in an attempt to reduce the number of heads, connections, trenching and labor costs. When a rotary sprinkler is forced to cover an area too small for its intended design, the result can be increased misting and inefficient coverage if it needs to be adjusted below manufacturer's specification.

SPRINKLER NOZZLES

Nozzles are the devices that disperse water onto the landscape as it passes through the head assembly. They control the amount of water being applied and the distance of throw. The amount of water distributed per minute over an area can vary greatly depending on the nozzle selected.

ASSESSING SPRAY HEAD AND ROTOR PERFORMANCE

Problems with spray heads and rotors can be caused by major system flaws resulting from overall bad design including improper zone layout, lack of proper overlap, and disregard for available pressure and flow. More than likely, however, their problems are non-system related. Fortunately, non-system related problems are easier and relatively inexpensive to correct.

Non-system related problems that affect head performance include:

- *Heads too close to walks and pavements*
- *Displaced heads that are sunken, offset or unstable in the soil*
- *Improper installation such as the lack of proper procedures during repairs and general sloppy work to keep dirt and debris out of the system*
- *Normal head wear and tear*
- *Incorrect arc adjustment*
- *Obstructions such as turf and branches*
- *Water quality including secondary water, well water, surface water pond or stream*
- *Broken heads resulting from such things as lawn mowers, edgers or snowplows or from a growing and maturing vegetation including roots*

Donut patterns and other dry spots could be the result of a number of problems associated with heads including non-compatible heads in same zone, lack of proper overlap, basic nozzle or arc adjustment, and obstructions cause by turf, plants or structures.

Misting and drift is caused by high pressure at the sprinkler nozzle that results in the breakup of the spray into a very fine atomized mist that sometimes looks like fog. The presence of misting is an indication that adjustments are necessary to increase the size of droplets by either regulating pressure or changing the type of head.

Spitting, lack of discharge and general poor head performance is probably an indication of clogged nozzles or partially closed valves resulting from low pressure. Debris in the nozzle can misdirect the spray and result in partial spray patterns or a complete lack of water being discharged. Debris in nozzles should be carefully removed. Digging or gouging could

permanently change the spray pattern. Nozzles should be cleaned with air, water or a soft bristled brush, such as a pipe cleaner. The use of wire or a screwdriver can permanently scratch the nozzle and misshape the orifices.

Rotation flaws are likely to be an indication of debris in head, pressure that is too low or high or flow that is too low, a damaged head, normal wear and tear, oversized nozzles, improperly adjusted flow control valve, vegetation obstructions, a bypass in need of adjustment, or foreign lubricants.

Excessively rapid rotation of rotary heads is likely an indication that the pressure is too high and requires regulation.

Damaged heads could be the result of vandalism, poor head location, pressure problems, normal wear and tear, and poor maintenance procedures.

Runoff, ponding and soggy turf could be major problems unrelated to the system or heads. There are a number of conditions that can cause these conditions including grading problems, tight soils, improper watering schedule, system drainage to a low head and valve problems. However, those associated with spray heads and rotors include:

- *Improper head layout and location*
- *Head rotation problems*
- *Leaking or stuck sprinkler*
- *Improperly adjusted arc*
- *Cracked housing*
- *Non-compatible heads in same zone*.

The following is a list of the most common irrigation mistakes that pertain to the use and

maintenance of spray heads and rotors. Correcting them is generally simple and inexpensive and could reduce operating costs.

Adjusting or reducing the throwing distance of nozzles more than 25 percent of the manufacturer's specified throwing distance.

Besides violating the manufacturer's specifications and warranty, this adjustment will produce an uneven precipitation, wasting water and increasing operation costs.

Disregarding significant conditions of overspray.

Overspray wastes water and is irritating and gives a negative impression to public. Liability is also an issue with overspray because it can be potentially hazardous to both pedestrians and motorists.

Exceeding the manufacturers specified head-to-head spacing.

Heads should be space a distance equal to the throwing distance for the selected nozzle at working pressure as listed in the manufacturers catalog. In the end, using a greater distance between heads will cost clients more in operating costs than can be saved during installation.

Installing different types of irrigation heads (rotors, sprays, bubblers, drip, etc.) on the same zone.

The precipitation rate for these components is entirely different. If heads with a lower precipitation rate are installed in a zone with heads that have a higher rate, water will not be applied uniformly and dry spots will occur. Also, such zones will have to run longer in order to apply enough water to irrigate the dry spots. This will result in wasted water, higher water and energy bills for the client and increased wear on the system without necessarily correcting the non-uniform appearance of the lawn.

Installing heads on risers next to pedestrian areas.

Heads on fixed risers next to sidewalks, plazas, and play areas can be a danger. A person or pet could fall on one these hazards, causing injury or death. If you routinely incorporate these in your systems, you should notify your insurance agent to make sure you have sufficient liability coverage to protect yourself and business should an accident occur.

Using incorrect nozzle patterns for the area you are watering.

Irrigation manufacturers make their spray nozzles in several part-circle patterns that throw water a maximum distance ranging from 8 to 15 feet. A professional irrigation designer will only use nozzles that have the correct pattern and distance needed for an area. Using the incorrect pattern and throwing distance will waste a considerable amount of water over time and significantly increase operating costs.

Using nozzles within zones that have mismatched precipitation rates.

Many in the industry assume that to water an area evenly with rotor heads they need to use the same GPM nozzles in every head. However, manufacturers make different GPM nozzles to give the flexibility to save water used in a zone by proportionally matching the precipitation rate of the nozzles.

As professionals, we know that in order to maintain a system for uniform coverage in the most efficient and cost-effective manner requires a broader knowledge of system pieces and parts than just the heads. It also requires skilled knowledge in the art, science, engineering and management of irrigation components in general. Major system or zonal problems cannot be assessed without looking at the system as a whole and having knowledge of business management and public relations is necessary to make it all work. We can quickly tell if a system is professionally designed, installed and maintained or if the work is a result of inexperience or indifference. The performance of a system depends on the integrity of its design, installation and maintenance and when any of these three components is compromised, so is the performance of the system and overall system durability.

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