

2017 ASIC NATIONAL CONFERENCE



OUR STAMP ON THE FUTURE

Through Technology, Best Practices and Awareness

Motif Hotel

Seattle, Washington



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Ewan Parker

Root Zone Visualization via Multi Sensor Soil Moisture Probes



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Ewan Parker, Director of Business Development, Tucor Inc



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Root Zone Visualization via Multi Sensor Soil Moisture Probes

Imagine an X-Ray for Your Soil Profile

Identify and Manage Your Root Zone

Add a Whole Other Dimension to Your Irrigation Management

See the Unseen via multi sensor soil moisture probes



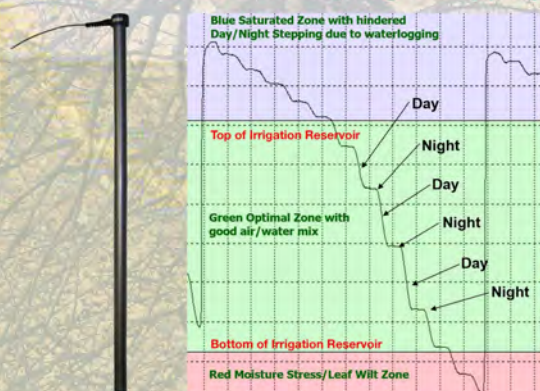
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Multi Sensor Soil Moisture Probes

See Root Activity & Irrigate to It!

ID RootZone Extents via Day/Night Stepping



Easily Maintain Optimal Moisture Levels

Add a New Dimension to your Irrigation Management

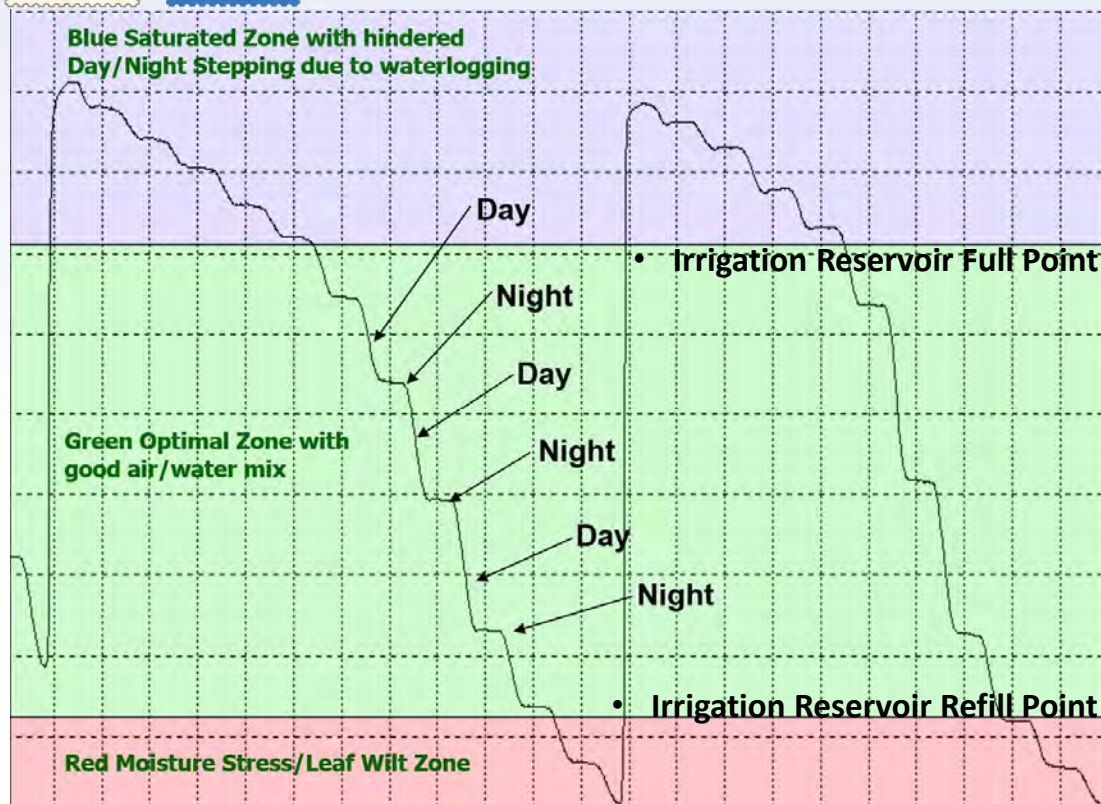
- Relative Soil Moisture Data

- Relative Soil Moisture Data allows you to see root zone activity via Day/Night Stepping
- Day/Night Stepping is demonstrated by a decline in volumetric soil moisture via the active removal of moisture by the plant material for use in photosynthesis during the day light hours
- At night soil moisture removal stops due to no photosynthesis and the graphing levels off
- Day/Night stepping identifies active root zone extents and allows us to irrigate to them



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- Optimized Soil Moisture
- Blue Zone = Small steps with minimal extraction due to poor moisture/air mix
- Green Zone = Larger steps with optimal extraction due to good air/water mix
- Red Zone = Return to small steps due to reduced water availability



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- Equipment
 - Multi Sensor Soil Moisture Probes
 - Multi sensor probes with capacitance sensors every 8" that measure and collect volumetric soil moisture data
 - Most accurate soil moisture sensors available second only to Neutron Probe
 - Probe collects volumetric soil moisture data points every 15mins vs snapshot of data every 30 days with Neutron Probe
 - Multi Sensor probes come in 8", 12", 20", 40" and 60" lengths with sensors every 8"s.





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- Installation
- Data quality is directly related to installation technique
- Less disruptive install = More representative data
- More representative data = Better results



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- Installation Technique and Mechanics
 - The Probe has a diameter of 1.25" Installation Auger has diameter of 1.27"
 - Installed with auger that's only 2 mm wider than the probe itself
 - Sensors scan 2" from probe wall through the auger cut and into native surrounding soil profile
 - Sensor has doughnut type sphere of influence and averages volumetric soil moisture from surrounding soil





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- Installation

- Auger allows for minimal disruption of native soil profile
- Less disruption of native soil stratification equals more representative data for surrounding zone
- In non sandy soil the use of a slurry based on removed soil is recommended to remove air gaps
- In sandy soil a watering technique is recommended.





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- Telemetry

- Wired or Wireless



- Up to five Multi Sensor Probes can daisy chained together to a wireless battery operated node for transmission back to a cellular/ethernet/WiFi gateway and on up to the web for graphing and visualization
- Alternatively each individual multi sensor probe can be hardwired directly to a gateway or 1:1 wireless node

- Questions?



- For More info come
- by our table top



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Larry Workman

Surge vs. Water Hammer & Installation



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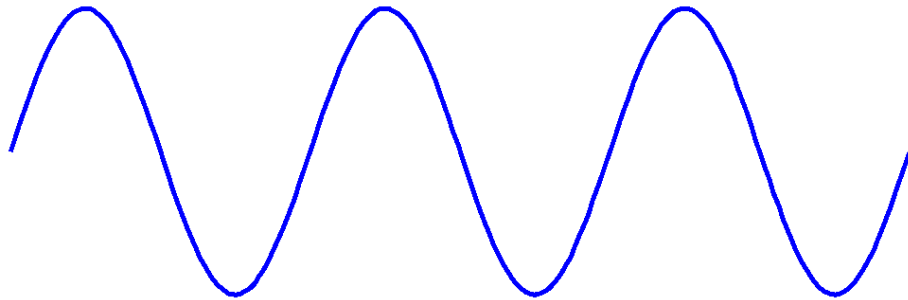
Expert4PVC Consulting



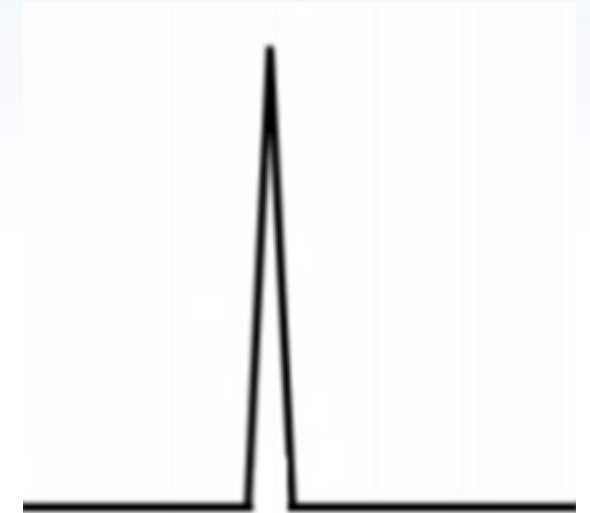
What is Water Hammer?

Water Hammer vs Surge

- **Water hammer** is a pressure surge caused when a fluid is forced to stop or change direction suddenly.
- It is a unique form of surge that has an extremely high amplitude and short duration



Surge



Hammer

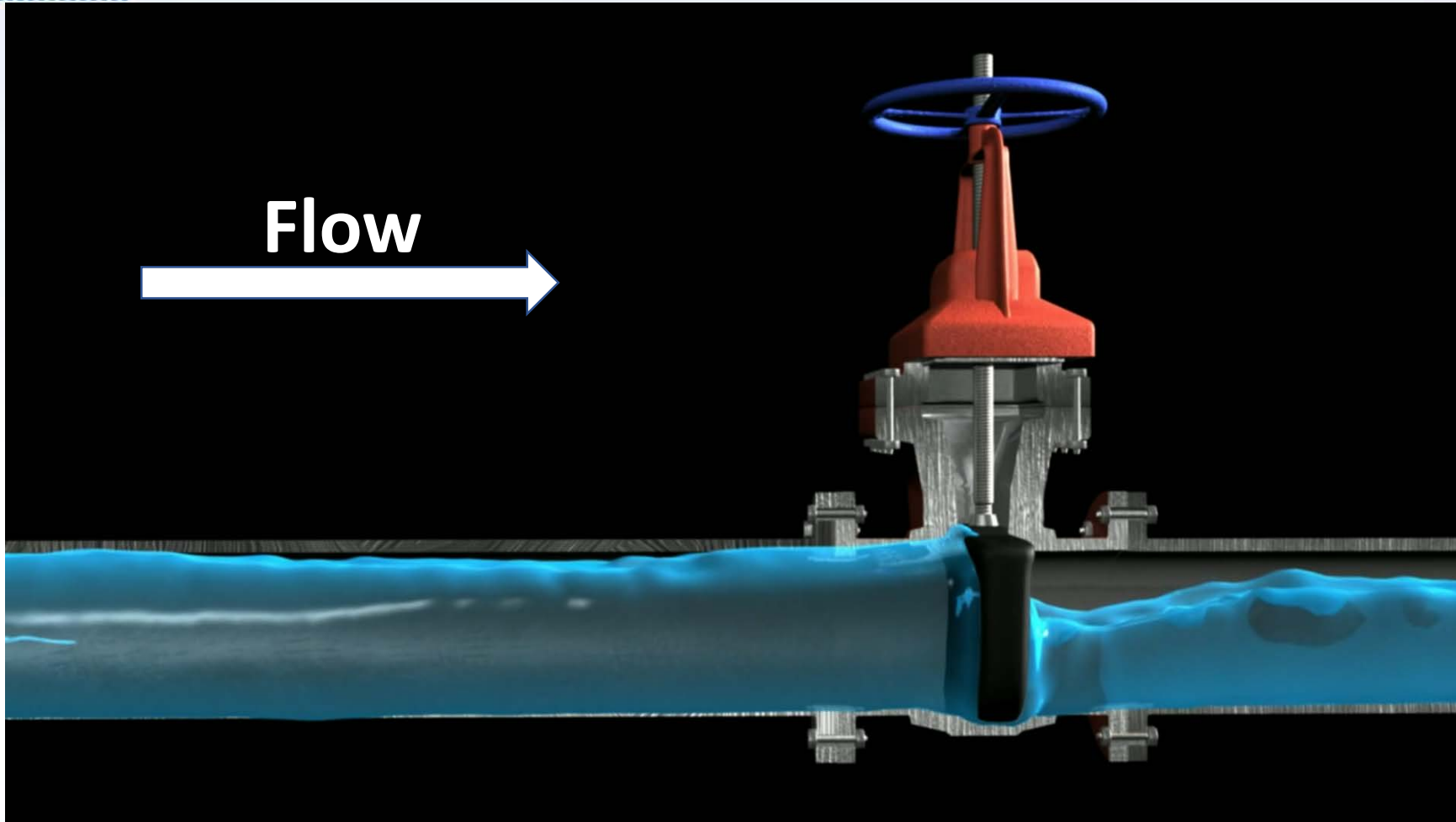


What is Water Hammer?



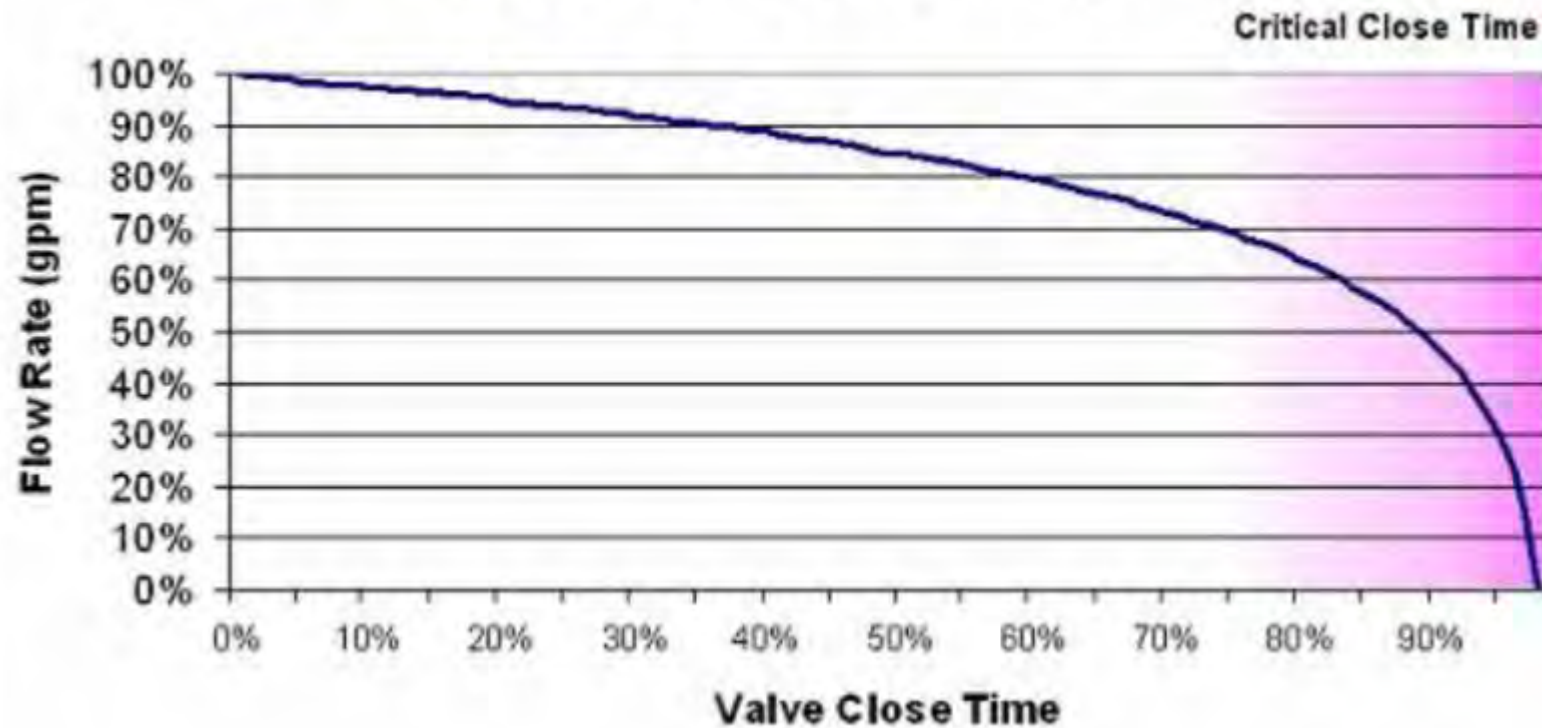


Valve “SLAMS shut!”





Flow Rate vs. Valve Closing





Calculating Hydraulic Shock

$$S = \left[\frac{E - E'}{(p/g) \times [E + (E' \times d)/t]} \right]^{1/2}$$

Where:

- E = Bulk Modulus of pipe (lbs/ft²)
- E' = Bulk modulus of fluid (lbs/ft²)
- d = Inside diameter of pipe (feet)
- p = Density of fluid (lbs/ft³)
- g = Acceleration of gravity (32.2 ft./sec.)
- t = Pipe wall thickness (feet)

Nayyar, Mohinder L. Ed Piping Handbook 6th Edition, New York: McGraw-Hill Inc., 1992



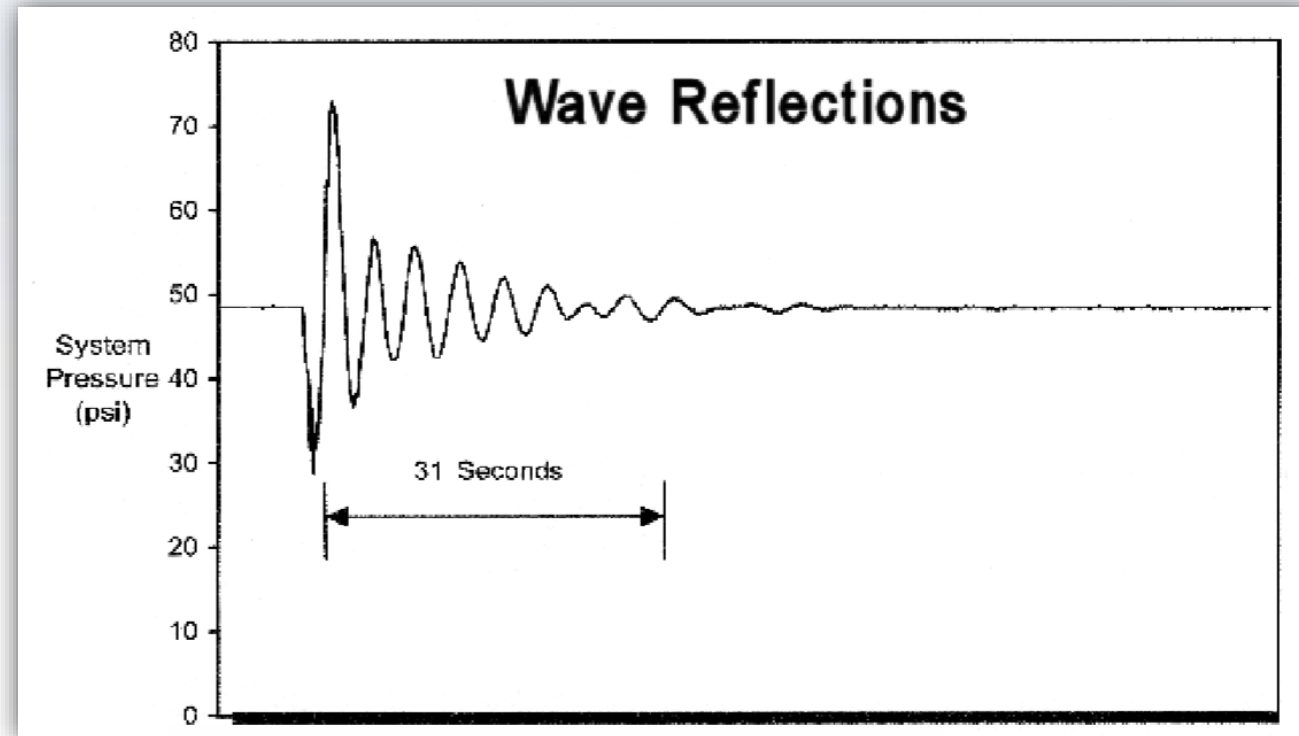
Things That Control The Magnitude

- Flow Velocity Change
 - **True time** to vary flow rate
 - Valve closing time
 - Air slugs
- Flow velocity
 - Momentum of fluid in motion
- Pipe Material
 - Strength of pipe material
 - Steel = Short valve closing, High surge
 - PVC = Medium valve closing, Medium surge
 - Poly = Long valve closing, Lower surge



Wave Reflections

- First surge is largest.
- Travels approximately 1440 ft./sec.
- Passes a $\frac{1}{4}$ NPT port in 14.4 microseconds
 - (0.000 0144 seconds)



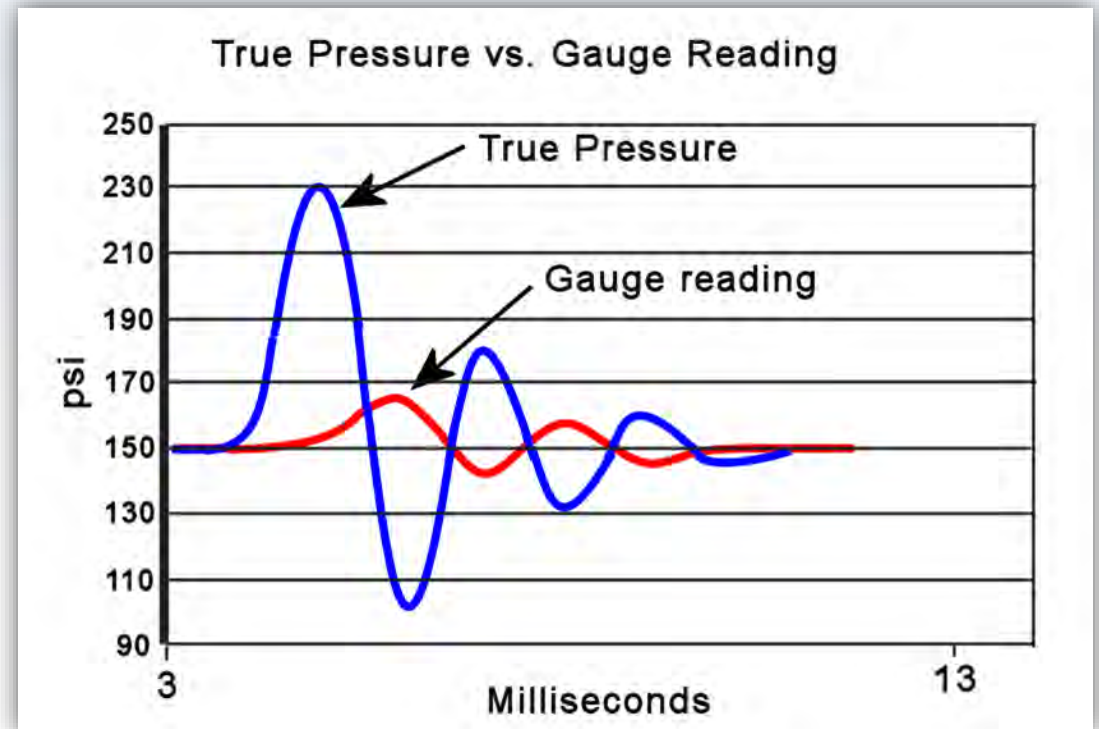


True Pressure vs Gauge Reading

- Delay due to inertia of mechanism.
- Peak is not recorded because of wave velocity.

Rule of thumb:

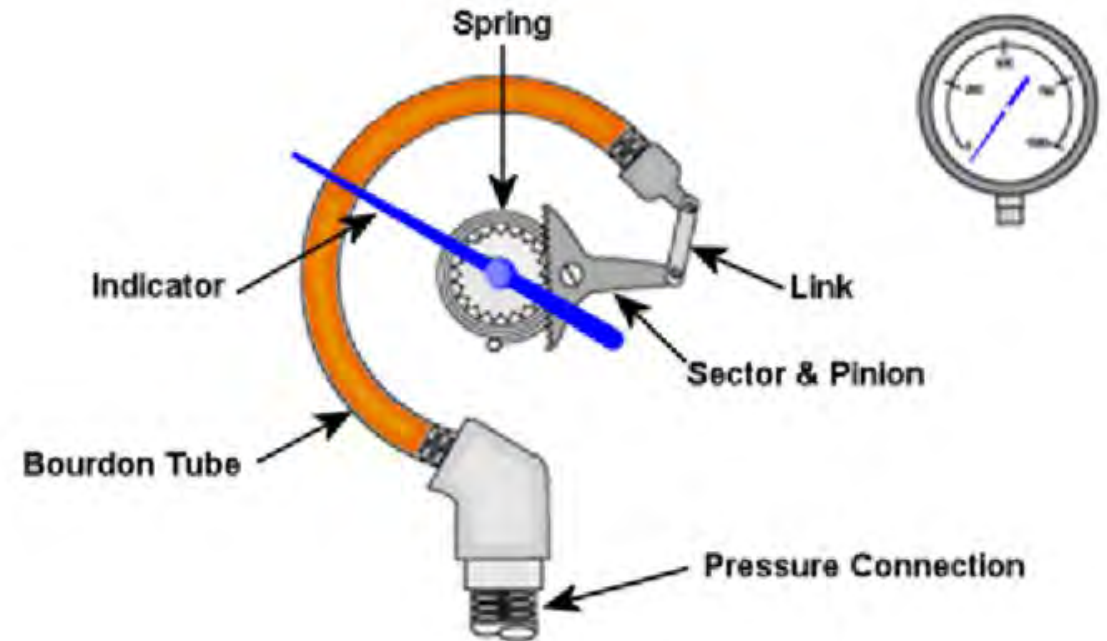
Gauge may indicate 30-60% of true surge





Gauge

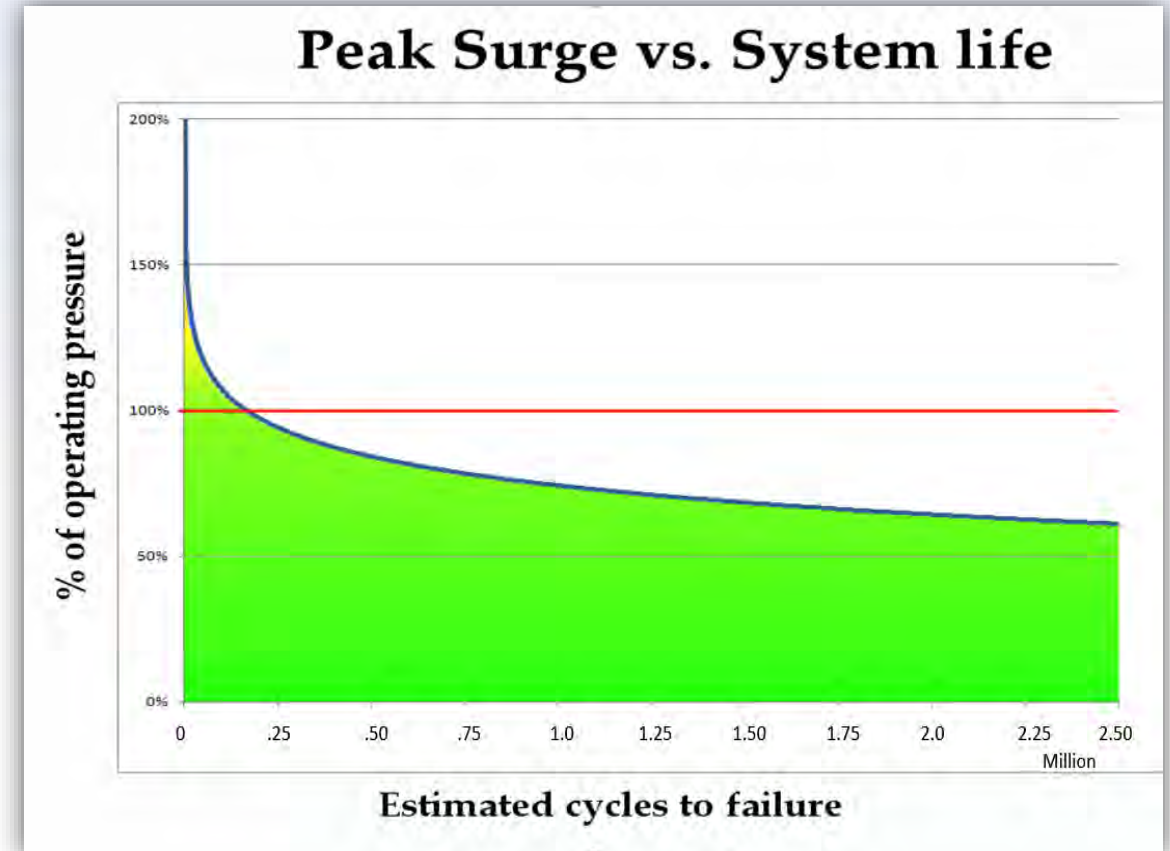
- Delay due to inertia of mechanism.
- Peak is not recorded because of wave velocity.
- **NEVER USE OIL FILLED A GAUGE!**





Cyclic Failure

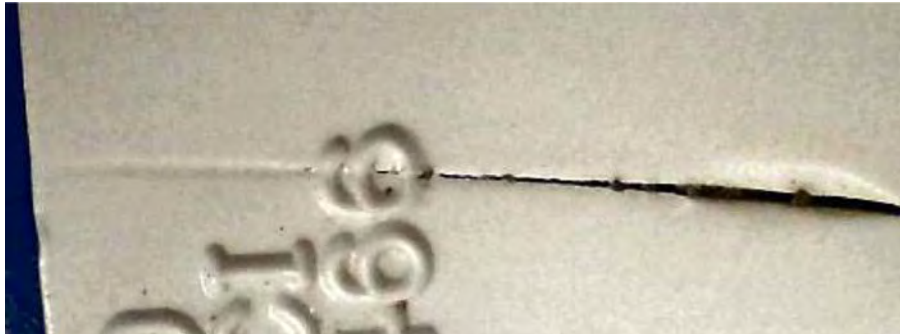
- PVC Fittings
 - Bliesner, FHA and Soil Conservation Services
 - Suggests using 60% pipe pressure rating.
 - Keep **PEAK** surge below pipe pressure rating.
 - 125% of pipe pressure rating, will fail at about 140,000 surges
 - Lower surges will extend life of fittings.
 - 75% of pressure rating, fatigue occurs at about 2.2 million surges.





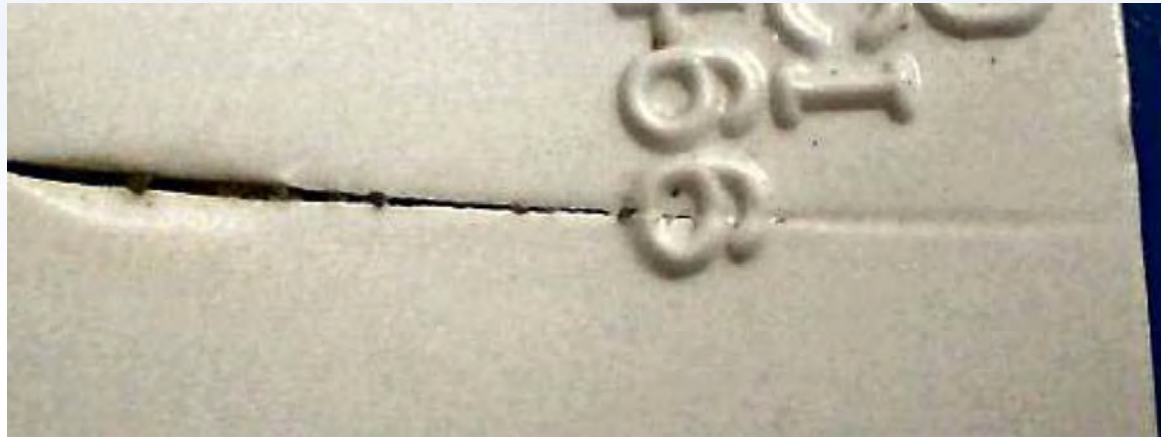
Fatigue Failure

- **Characteristics**
 - Straight line
 - Follows fluid flow
 - “Erosion” around hole
 - “Stretch Marks”



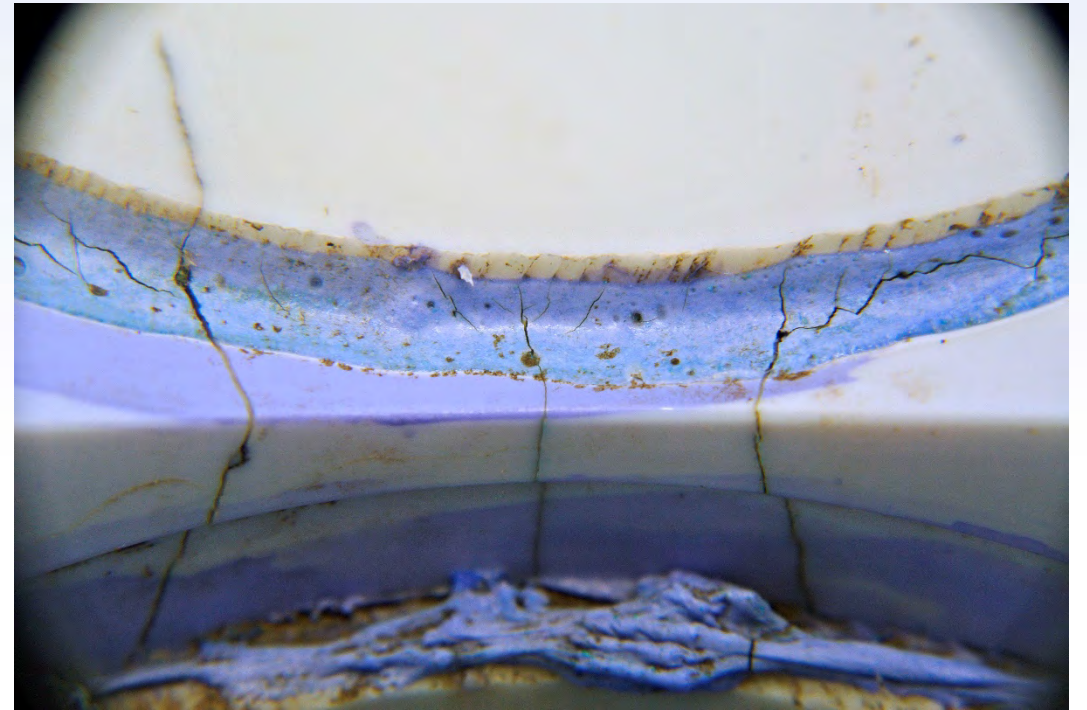


Cyclic Failures





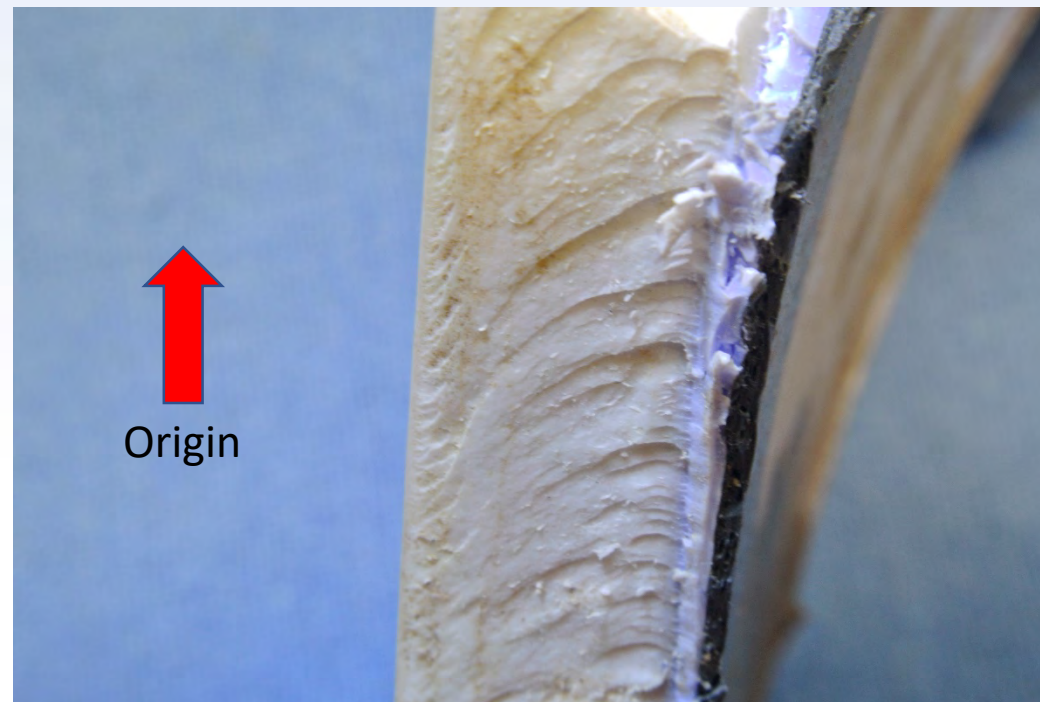
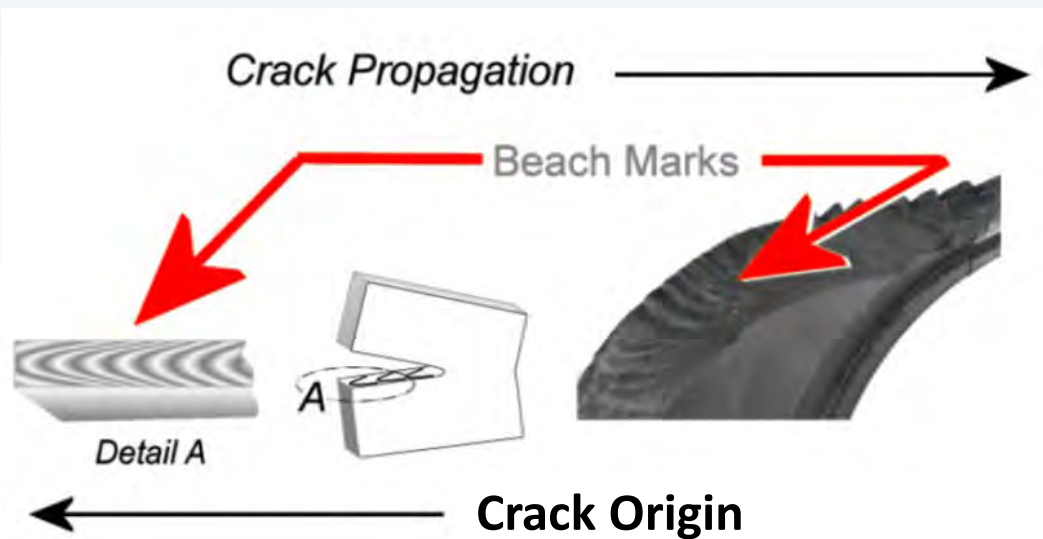
Cyclic Failure



Cyclic fatigue starts on the interior and works outward!



Cyclic Failures





Common Causes

- Opening and closing of valves
- Starting and stopping of pumps
- Changes in pressure
- Entrapped air



Water is 2% air by volume

1000 foot long pipe can contain 20 feet of air

Added sources of air in the system:

- System drain down
- Maintenance
- Pump Cavitation
- System leaks
 - Component failure
 - Seals



Air Vents

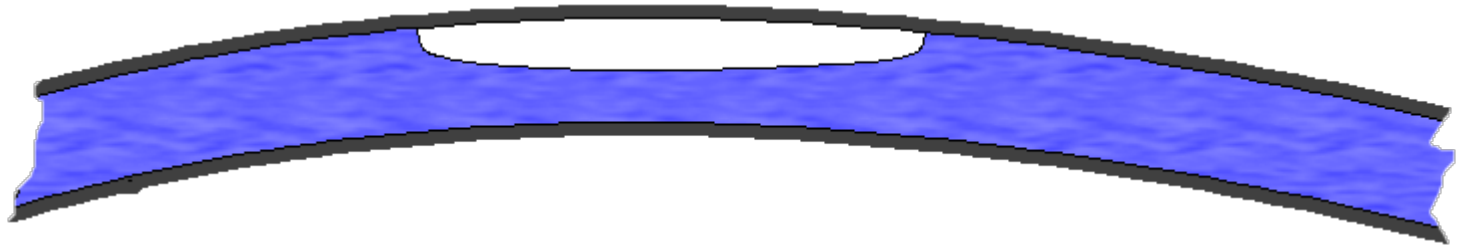
- Do NOT eliminate!
- Use manufacturers recommended sizing
- Place in system high points
- Pump outlets





Air Slugs

- Can form at high points
- Filling a system
- Drain down of a system





At the End...

- Velocity drops at end of “Air Slug”
 - System velocity = 4 ft./sec. **OK!**
 - Velocity during Air Slug = 20 ft./sec. **Oh-oh!**
 - End of “Air Slug” velocity change

$$20 - 4 = \mathbf{16 \text{ ft./sec.}}$$



Good Practices

- Air relief valves
- Variable speed pumps
- Slow closing valves
- Low flow velocity



Calculation Tools

<http://www.Expert4PVC.com>

Expert4PVC Consulting
PVC Pipe and Fittings
21336 Manzanillo • Mission Viejo, CA 92692 • 731.234.7916 • EIN 45-3738236

Home Experience Tech Data Tools

Water Hammer & Surge Pressure

System Pressure: (psi)

Velocity Change: (ft./sec.)

Pipe Run Length: (ft.)

Pipe Material:

Pipe Diameter: (IPS)

Schedule/SDR:

Dimension Ratio:

Wave Velocity:

Critical Valve Close Time:

Surge Pressure:

Total Surge Spike:

Surge Calculator
Expert4PVC Consulting
PVC Pipe and Fittings
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Water Hammer & Surge Pressure

System Pressure: (psi)

Velocity Change: (ft/sec)

Piping Run: (ft)

Pipe Material:

Pipe Diameter:

Schedule/SDR:

Dimension Ratio:

Wave Velocity: (A) ft./sec.

Valve Close Time: (Tc) Sec.

Surge Pressure: (psi) p.s.i.

Total Surge Pressure p.s.i.

• • Basis of Calculations • •





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Thank You!



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Michael Derewenko

A Lesson in Landscape Photography



Michael Derewenko
JAIN Irrigation



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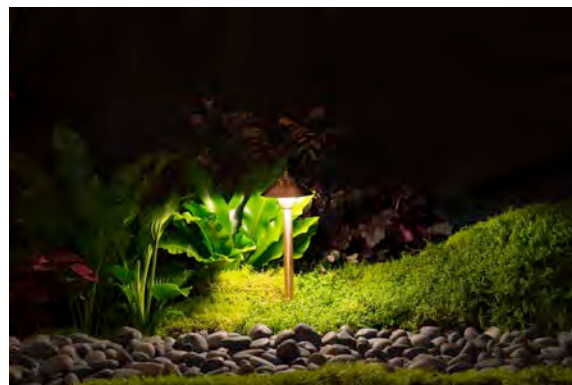
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Basics of Photography



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Basics of Photography

- Aperture
- Shutter Speed
- ISO or Film Speed





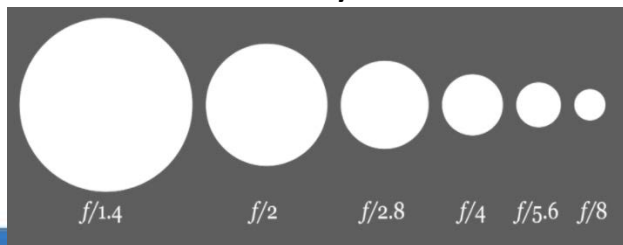
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Basics of Photography

- **Aperture**

- Size of hole that allows light to enter camera's film plane or digital sensor plane
- Depth of Field – is the amount of your shot that will be in focus:
 - A large depth of field means that most of your image will be in focus whether it's close to you or far away.





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Basics of Photography

- **Shutter Speed**
 - Speed the leafs move to close
 - Higher the speed, the more action you are freezing





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Basics of Photography

- **ISO or Film Speed**
 - Film – Digital Planes are a sponge, how much light can your sponge absorb?
 - Higher the ISO the less quality and more grain





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When to use an SLR?

- Printing
 - Posters
 - Magazine Ad
 - Wall print
- Medium larger than 5 x 7

When to use an iPhone?

- Blog posts
- Websites
- Low res pdf





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File Management:

- Events
 - FIS Golf Tournament 4/2/17
- Projects in Progress
 - Kingman Residence 2/17
- Finished Projects
 - Kingman Residence 3/17
 - Hearst Castle
- Product Photos
 - JAIN Irrigation
 - Octa-Bubbler
 - Saddles
 - Saddles Installed
 - Hunter Industries
 - MP Rotator
 - MP Rotator Installed
- Personal Photos
 - Rapunzel's Halloween





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Software

- Apple Photos
 - File management with simple correction options
- Aperture
 - File management with simple to advanced image correction
- **Adobe LightRoom**
 - File management with image correction
- Adobe Photoshop
 - Image enhancement and correction
 - Layering
- Adobe InDesign
 - Marketing material design
- Adobe Illustrator
 - Charts, graphics and designs from scratch

* Moving source files will make management software go crazy.





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Lighting



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- Try not to force a shot.
- Control light when possible.
- Reflective light can be easy.
- Shoot early and late in the day.



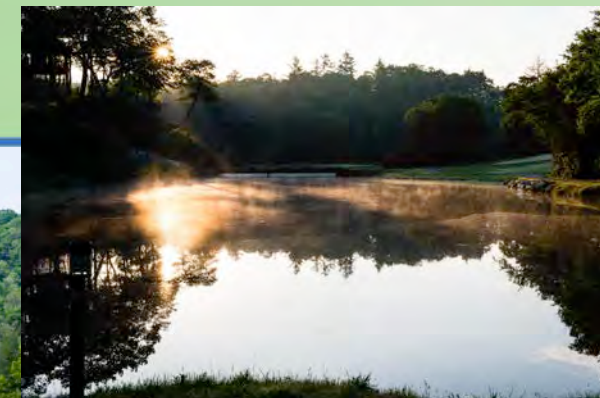


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Natural Light

- Shoot water when backlit to highlight spray pattern
- Avoid shooting in cloudy weather unless you are shooting people
- Utilize natural polarized light





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Natural Light

- Know the weather
- Southern clouds build up in midday to produce good late day filtered light
- Be careful of wind





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Natural Light

- Reflective light - Use a reflector in place of a flash when shooting tighter shots during the day
- Filter light when possible with a scrim





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Natural Light

- Tricks of the trade
 - Reflectors, scrims and neckwear





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Artificial Light

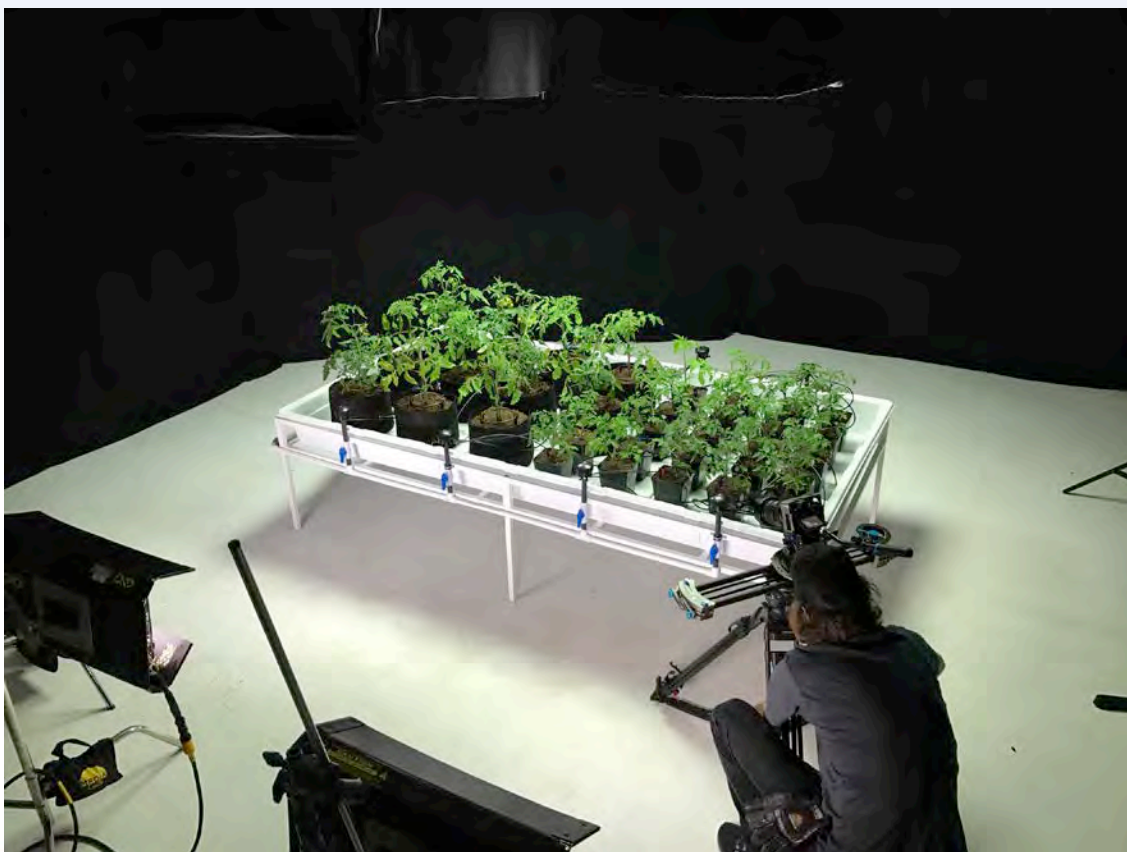




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Artificial Light





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Tips

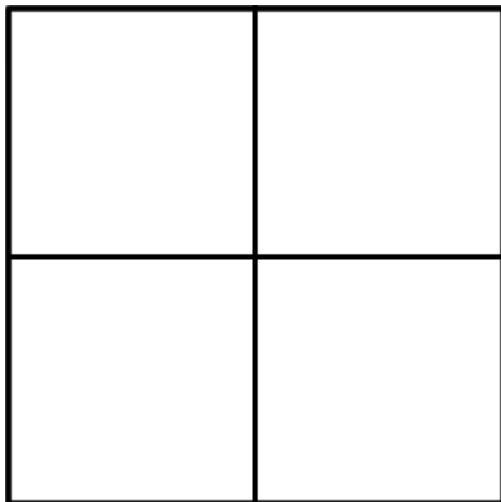


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Easy Framing and Lighting Tips:

- Look for lines
- Use frame corners
- Avoid foreground dark spots
- Try to match light intensity from sources
- Try not to split the frame in fours with subject matter





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Too Much Sky



Not Enough Sky



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Long Exposures:

- A good tripod is key!

*Note how the tree line on the right draws your attention to the house.





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- Avoid Hot Spots
 - White and light colored surfaces





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Bend your knees!





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Thank You!

