Fluid Treatment Solutions, Inc.

- The development of physical water treatment
- Fluid treatment solutions through applied technology
Why you should consider the use of the FluidTron® as your primary water treatment solution

• These systems are engineered specifically to meet your water treatment requirements.
• Typically you will be able to eliminate or dramatically reduce chemical treatments for standard applications.
• Normally you will be able to run your towers at higher levels of conductivity.
• Enhance your financial and environmental impact by using fewer chemical additives and less water.
Colloidal Particle Formation

Physical water treatment is based on the formation of colloidal particles within the bulk solution.

Ions of opposite charge such as calcium and bicarbonates are pushed and pulled within the bulk solution. The formation of colloidal particles is based on the probability that contact will be enhanced within the treatment zone between the electrode surface and the ground surface.
As the fluid bearing ions in solution flow through the treatment zone they are effected by the anode (positively charged electrode) and the cathode (grounded surface). As these ions come into contact with one another they form colloidal particles and move from solution to suspension.
Colloidal particle formation moves ions from solution into suspension. This reduces the dissolved (ions) minerals carried by the water. The water is now capable of dissolving additional ions. It will begin to gradually dissolve existing deposits.
The temperature probe pictured above shows the removal of existing deposits. These deposits were removed gradually as a result of the water’s ability to dissolve the deposits because the concentration of ions in solution had been lowered due to the formation of colloidal particles (in suspension).
Colloidal particles are very stable and by their nature prefer to remain in suspension. In fact their total surface area will exceed the surface area of the plumbing and heat exchange surfaces within your system. These particles become sites upon which other ions can begin to collect.

These colloidal particles are sub micron size (millions of molecules), however, they are too large to adhere to the piping or heat exchange surface. These particles will be removed from your system during your normal blowdown or venting procedures.
Applications

- Cooling Towers
- Boilers, Low pressure fire tube or water tubes
- Hot water re-circulation systems
- Chilled water re-circulation systems
- Process water streams
- Parts washing systems
- Paint overspray booths
- Applications that experience scaling
Cooling towers are treated for three specific problems:

- Scaling
- Corrosion Control
- Bio-Fouling
Cooling tower scale treatments:

Chemical treatments hold the ions in solution by controlling pH. Calcium carbonate prefers to stay in solution at a lower pH (acidic), however, due to its inverse solubility, it wants to plate out as the water temperature rises.

Electrostatic systems create colloidal particles that remain in suspension in the water. These systems operate at higher pH levels reducing the corrosive impact of the fluid on your towers and plumbing systems.
Corrosion control in chemically treated towers requires the addition of other chemicals and generally is required to offset the impact of chemicals added to control scaling.

Corrosion control in most electrostatically treated towers is a natural process of allowing the cooling tower water pH to rise naturally. Normally the pH in an electrostatically treated tower will be between 8.3 and 9.5
Bio-Fouling Control:

Electrostatic treatment systems are not biocidal, however, they are bio-static. They will impede biological growth by altering the water conditions. This makes it difficult for the bacteria to propagate. Most biologicals prefer to live in an environment in which the typical pH is 8 or less.

Additionally, the electrostatic system will dissolve scale and assist in the removal of the bio-film layer. The removal of this layer exposes the bacteria to the higher pH water as well as the chlorine and other biocides in systems that are fed by municipally treated water.
Keys to effective application of your electrostatic treatment system

- Strength of Field \( E = \frac{V}{D} \)
- Dwell time (contact time) in the electrostatic field
- Ratio of active treatment area to the volume and re-circulating rate of the water in the system
- Low fluid back pressure caused by the introduction of electrodes.
The stronger the field the greater the impact the electrostatic treatment system will have on your system. FTS operates its standard systems at 30-35KV at very low amperage.

Field strength is impacted by the materials and geometry of the electrodes. Some materials create stronger fields than others or have better resistance to chemical attack or abrasion. FTS offers several different electrode designs based on a composite construction to offer a full range of coverage for our customers.
Standard electrode designs have been tubular in form. The strength of the field declines as you move away from the surface of the electrode.
Electrode Geometry and Field Distribution: Flat Plate Design

Flat plate electrodes allow for a more uniform distribution of the electrostatic field, with greater surface area and lower back pressure. Only FTS has patent applications for plate style electrodes.
Field Installations

• Four types of installations allows FTS to apply the proper design to:
  - Obtain the proper ratio of active surface area to volume and flow rate,
  - Maximize the field uniformity and strength
  - Achieve low back pressure
  - Minimize down time and cost
Types of Installations

- **Direct Insert** – installed directly into a piping system
- **Side Stream** – installed in applications where other installation types cannot be achieved
- **Tubular Rack Submersible** – Tubular form electrodes installed in a self contained channel
- **Plate Rack Submersible** – plate form electrodes installed in a self contained channel
Direct Insert Installation:

This Victaulic fitting was adapted to allow the direct insertion of an electrode into the piping system.
Side Stream Installation:

Most side stream installations are equipped with their own pump in order to continuously move the water from a sump through the chamber.
Submersible Rack - Tubular Electrodes - Longitudinal Flow

This form allows for the submersion of tubular electrodes within a self contained channel. Submersible racks are easily installed directly into a tower sump or basin.
Submersible Rack - Tubular Electrodes - Transverse Flow

Another variation of the tubular rack is the transverse flow models. These systems are easily installed and have large active surface areas.
Flat Plate Rack System - Longitudinal Flow

Submersible flat plates allow for the introduction of larger active surface areas into the fluid flow. This system was designed for longitudinal flow past the electrodes.
This submersible flat plate design was developed specifically for high flow systems with limited access to the basin. These systems are easily installed and very effective due to their high surface area to volume of water ratio.
Submersible Systems

Advantages

• High efficiency due to large active surface areas, composition and maximized field (uniformity and strength)
• Ease of installation – accomplished with little or no down time
• Flexible design allows for full range of engineered possibilities for maximum performance
After 5 years of service this tower, equipped with a FluidTron® treatment system, has been kept scale free. This tower runs consistently at 3400 micro mohs and the conductivity of the make up water runs between 1200 and 1400 micro mohs.
Twelve months after installation of the FluidTron® treatment system these evaporative condenser tubes have been kept in excellent condition, this assures maximum heat exchange. This tower runs consistently at 3600 micro mohs.
Two years after installation of the FluidTron® side stream system this boiler continues to operate scale free.
Our Customers Include:

- Wal Mart – evaporative condensers
- General Electric – parts washing systems
- John Deere – spray booths
- Citi Corp – cooling towers
- Hallmark Cards – cooling towers
- U.S. Army corps of Engineers – cooling towers
- University of Kansas Medical Center – cooling towers
History

With over 40 years of field proven product history we have thousands of applications world wide in schools, hospitals, industrial and commercial installations.
FluidTron® System Benefits

- Fluid treatment performance that will meet or exceed the performance of your current chemical treatments.
- Financial savings associated with the elimination or reduction of chemical treatment, reduced water consumption and discharge fees and maintenance costs. Typical payback: 12 – 18 months.
- An environmentally friendly approach to the treatment of process water.
- A treatment program that can be used in scale control applications where chemical treatments cannot be applied.
Payback Calculations

- 1550 Ton Cooling Tower – Arizona – Payback 15.9 months
- 1200 Ton Evaporative Condenser – Utah – Payback 12.9 months
- 400 Ton Cooling Tower – Oklahoma – Payback 14.1 months
- 8000 Ton Cooling Tower – Kansas – Payback 15.7 months
- Additional information available