METSI ENVIRO TECH PVT LTD

Innovative Technological Environmental Solutions

25 YEARS
ENVIRONMENTAL SUSTAINABILITY

WATER BATTERY

CLAIRE FONTAINE®

Advanced Electrolyt - ionic Technology

NON HAZARDOUS LIQUID

FOR COOLING TOWER

Powered By

LAMBERT
Serve to Conserve

An initiative of

ICCW
INTERNATIONAL CENTRE FOR CLEAN WATER

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

विज्ञान एवं प्रौद्योगिकी मंत्रालय
MINISTRY OF SCIENCE AND TECHNOLOGY
सत्यमेव जयते

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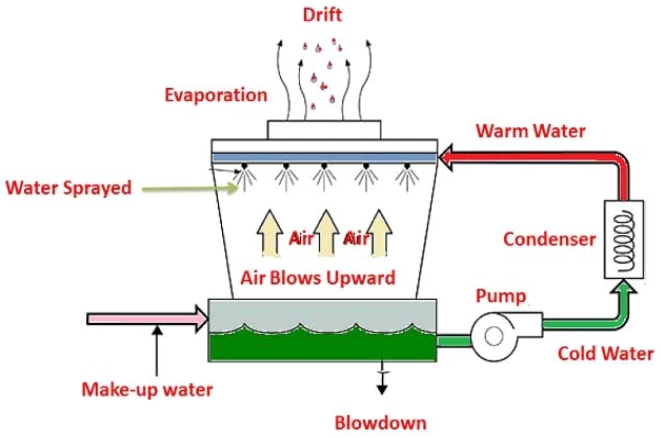
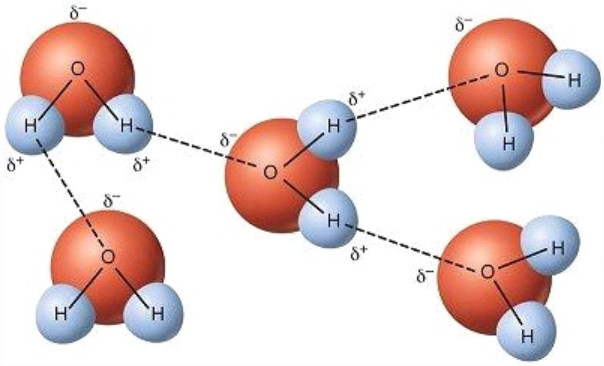
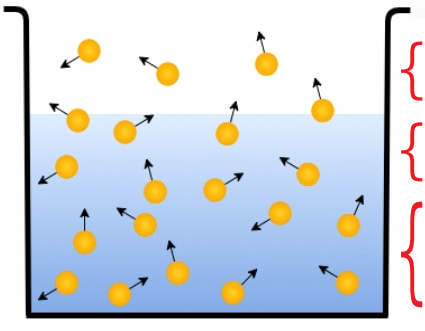
A Typical Cooling Tower



Hydrogen Bonding of Water



Evaporation Causes Cooling



High Energy Particle
Evaporating

Medium Energy Particle
Pulled back into water

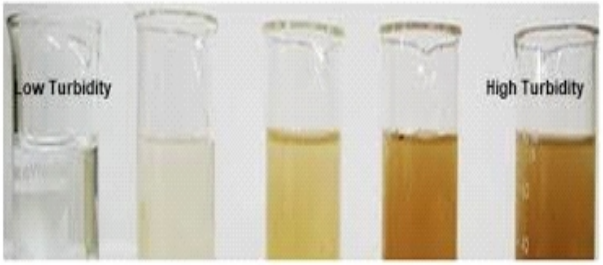
Low Energy Particle
Remain Liquid

Problems In Cooling Tower

SCALE

CORROSION

MICROBIAL GROWTH / GENERAL FOULING



SUSPENDED SOLIDS

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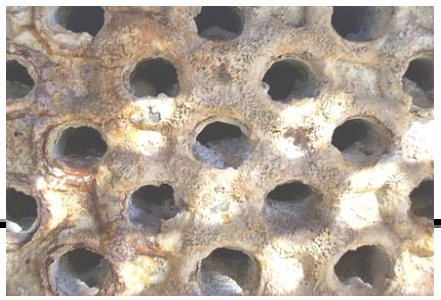
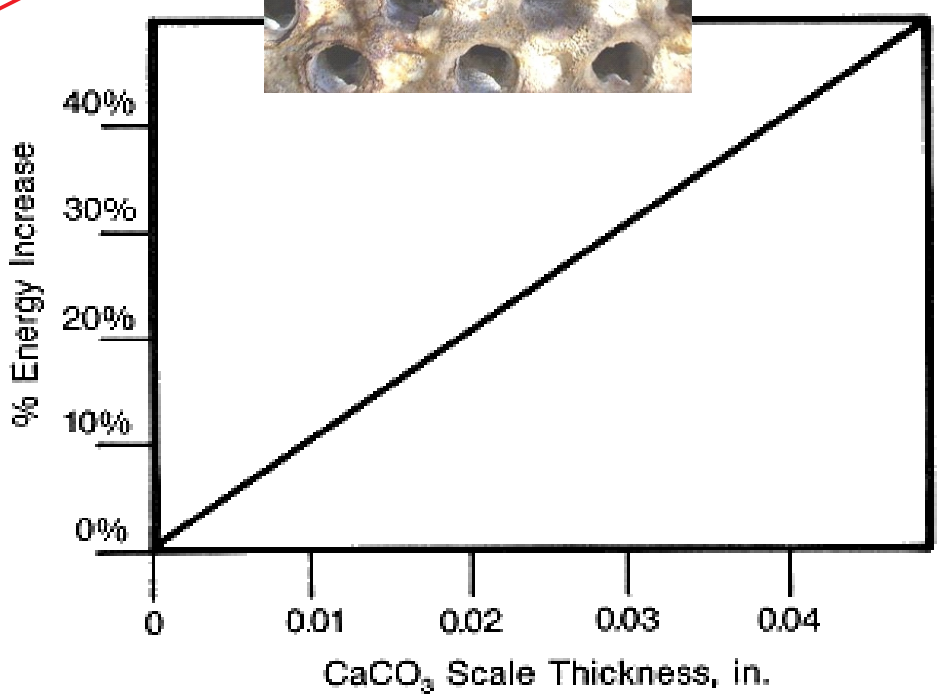
How Does Condenser Scaling impact your Energy Consumption?

Scaled heat exchangers increase energy consumption & operating costs.





Factors Affecting Scaling

Temperature ↑

pH & Alkalinity ↑

Conc. of Scale Forming Salts ↑

Suspended Solids ↑

How To Control Scale ?

- Limit The Concentrations of Minerals
- Use Corrosive Acids & Chemicals
- Use Safe Eco Friendly

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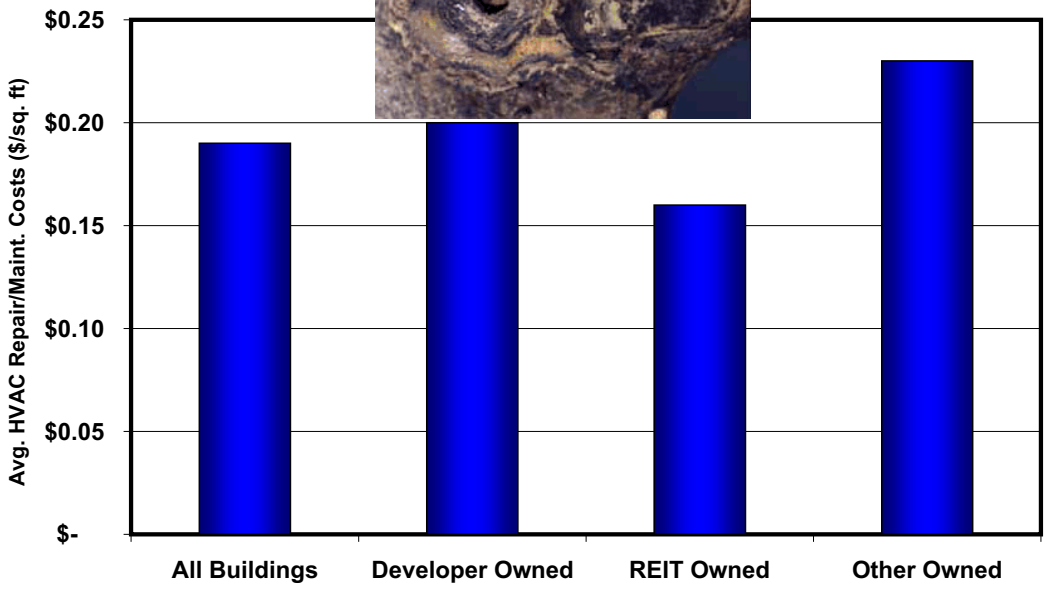
Corrosion

A natural process converting processed metals to their native state.

How does Condenser Corrosion impact your Maintenance Costs

Corrosion failures are expensive and inconvenient!



Factors Affecting Corrosion

↑
Dissolved Gases
Scale Deposits
Suspended Matter
Microorganisms
Temperature
Heat Transfer
Dissimilar Metals

↑↓
pH
Dissolved Solids
Velocity

How To Control Corrosion?

- Use Corrosion-resistant Materials
- Apply Inert Barriers/Films
- Use Sacrificial Anodes
- Apply Corrosion Inhibitors
- Adjust Water Chemistry with

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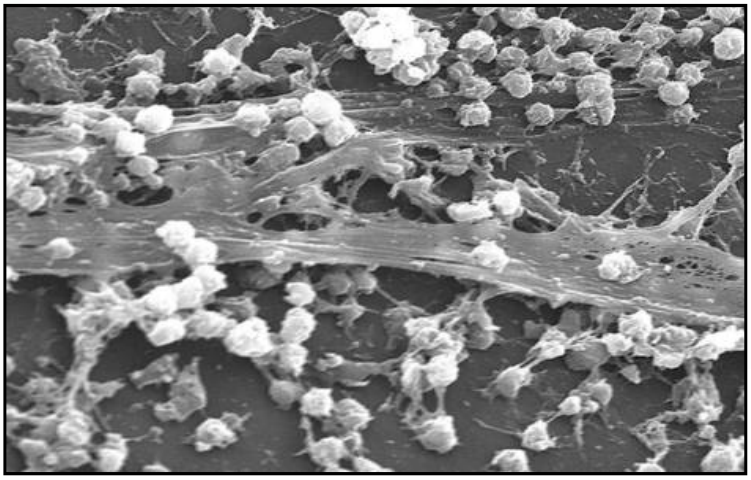
Fouling



- Loose, non adherent deposits made up of insoluble particulate present in the make up water.
- Introduced to the cooling system by process leaks, wind or microbiological growth.
- Proliferation of microorganisms, which can directly or indirectly reduce the performance of Cooling system.

Biofilm adversely affects Thermal Conductivity

Sl. No.	Material	Thermal Conductivity (BTU/ft2h °F in)
1	Clean Carbon Steel	310
2	Analcite Deposit	8.8
3	Calcium Phosphate Deposit	25
4	Calcium Sulphate Deposit	16
5	Magnesium Phosphate	15
6	Magnesium Iron Oxide	20
7	Silicate Scale (Porous)	0.6
8	Fire Brick	7
9	Insulating Brick	0.7
10	Bio-Film	0.4

How To Control Microbiological Problem

Traditionally - Adding oxidizing & non-oxidizing biocides.

Advanced Technology

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Non Hazardous Disinfection System

(Advanced Electrolyt-ionic Technology will generate oxidants without need for hazadrous chemicals)

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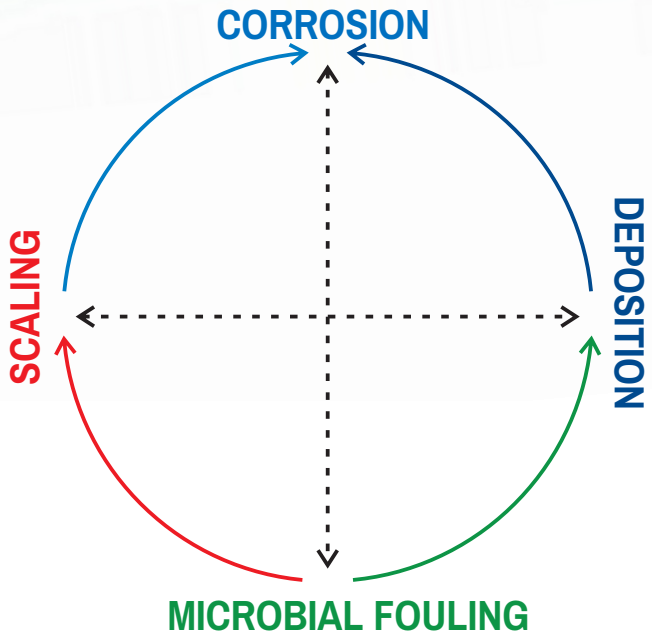
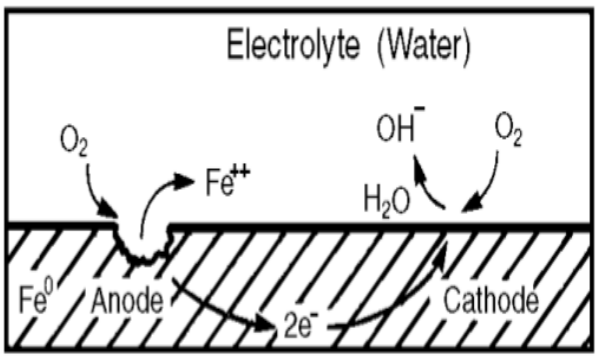
Problem Cycle in Cooling Water System



Corrosion Mechanism



Anode Reaction:

$Fe^{\circ} \rightarrow Fe^{++} + 2e$

Cathode Reaction:

$1/O2 + H2O + 2e \quad 2(OH)$

These can be summed to give the overall oxidation reduction reaction

$Fe + 1/2O2 + H2O \rightarrow 2Fe\ 2(OH)$

Technology

- Scale Control
- Corrosion Control

For microbial growth, disinfection protocol is followed for recirculation.

- **Eliminates Scaling**
  Removes temporary hardness ($CaCO_3$, $MgCO_3$), prevents scale buildup and ensures optimal heat transfer with lower maintenance costs.
- **Biofilm Control**
  Generates powerful free radicals. Provides support for removal of biofilms, algae, and bacteria.
- **Control Corrosion**
  Maintains high pH and balanced water chemistry, Minimizes corrosion risks without over-softening the water.
- **Targets Pathogens**
  Actively destroys harmful microbes like Legionella, enhancing cooling tower safety and water quality.

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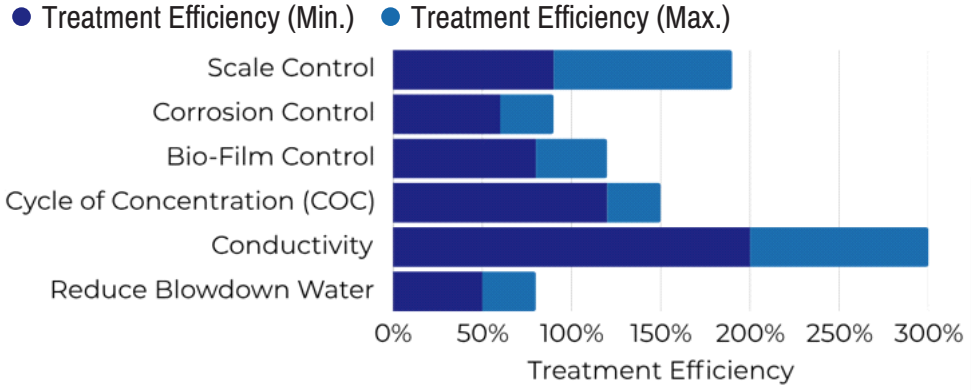
Schematic

Structure	
1	Reactor
2	Control Panel
3	System Inlet
4	System Outlet
5	Feed Pump
6	TDS Sensor
7	pH Sensor
8	ORP Sensor
9	Disc Filter Cartridge
10	Self Cleaning System

Comparison of Efficiency



50% Blowdown Reduction

2X. Higher COC

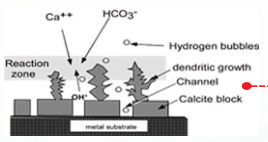
50% Scaling Reduction

30% Better Heat transfer

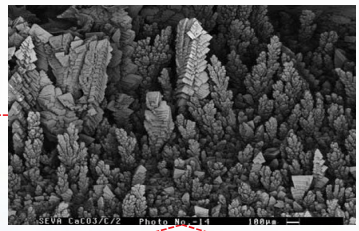
20% Energy Efficient

NIL. No Chemical

Crystal Orientation

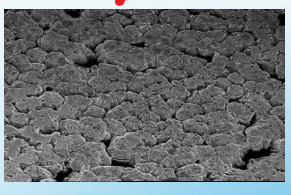


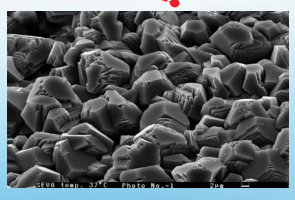
Schematic of a Crystal orientation



Crystal orientation: Dendritic growth of a thick hardness layer.

Lower face of, showing channels between the crystal blocks.





Upper face showing pure hardness crystal

- Power module alters voltage to ensure that dendritic removal is automated via physical surface cleaning of the electrodes.
- Combination of specialized metals for cathode & anode ensures consistency in passing of current & voltage. From the electrodes.

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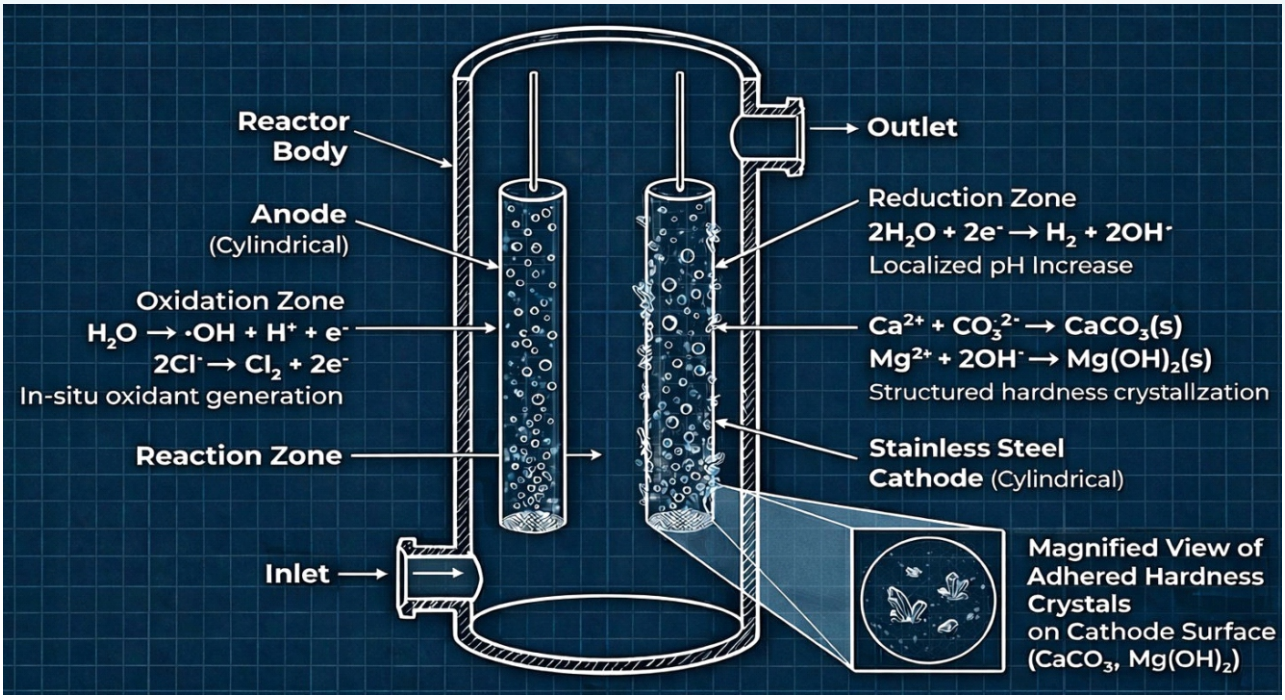
Reactor Process



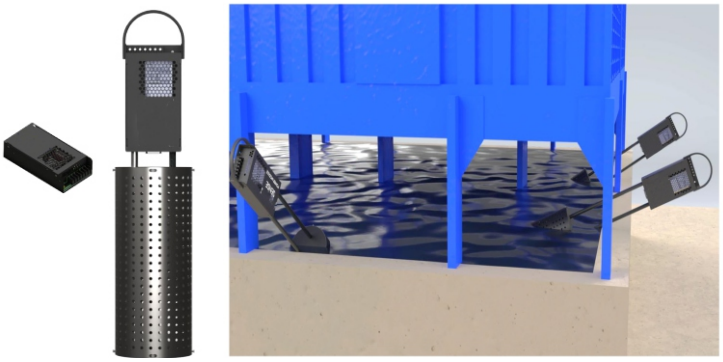
Models

Manual Model

Manual measurement of ORP, Ph, TDS.

Manual cleaning of electrode based on dentritic build up

Upto 700 TR



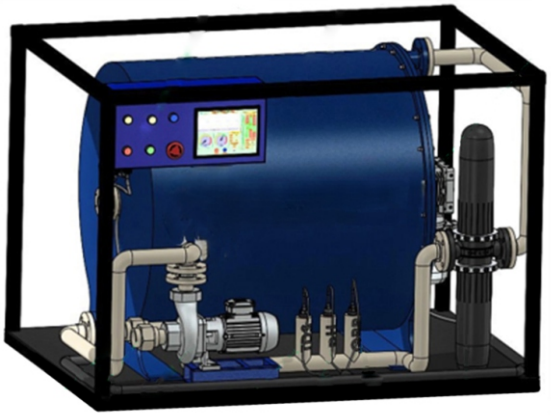
Automated Model

Online measurement of ORP, Ph, TDS.

Automated cleaning of electrode based on dentritic build up

Above 300 TR.

Customized.



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