ElectroLife

FOR SCALE REMOVAL AND ENERGY SAVINGS

"a totally new approach to cooling towers"

Auto-programed **chemical free** operations for **Chillers**, **Boilers** & **Hydrothermal** equipment

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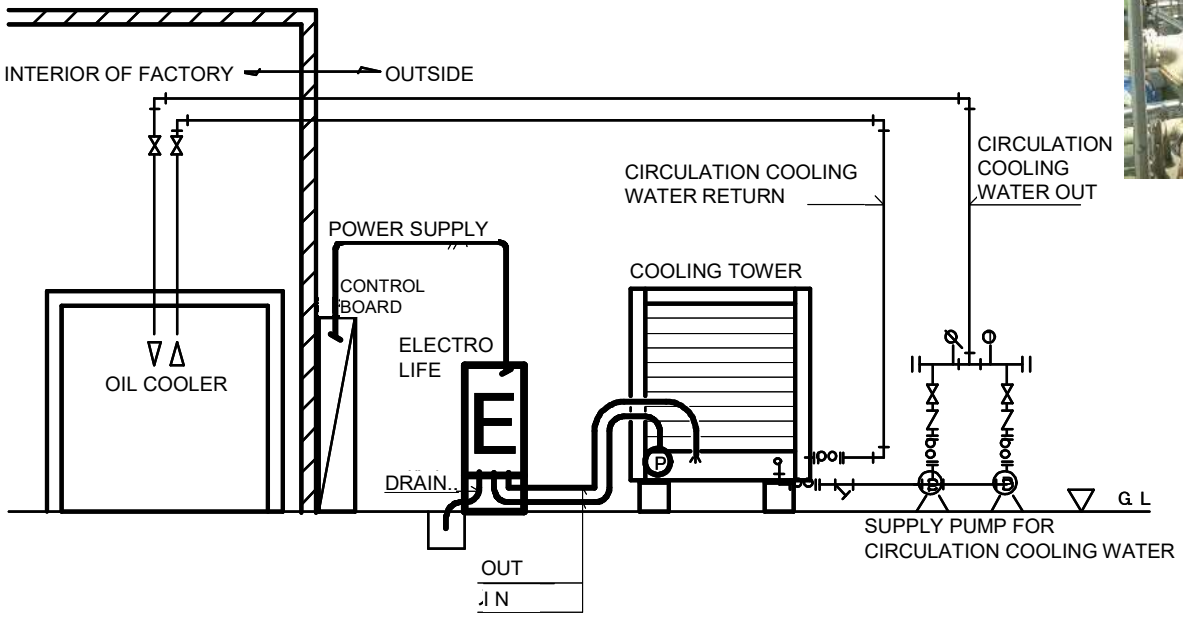
ElectroLife METHOD OF INSTALLATION



ElectroLife CORE SCIENCE---*IONIC PRODUCT THEORY*

- **The properties of water are greatly altered when electricity is applied to water through *electrolysis.***
- **The alterations bring about an interesting phenomenon to the properties of water.**
- **Logical theories explaining this phenomenon are still far and few.**
- **The *Ionic Product Theory,* published by Dr. K. Hanaoka, best describes it.**

ElectroLife IONIC PRODUCT THEORY

- **The smaller the value of the pIP of water exposed to electrolysis—the water solvent's effect, extraction capability and reactivity become greater.**

- **When any form of energy is applied to water, the number of molecules that are set free increases.**

  As an example, when increasing the temperature of water, the subcritical state of water's dispersed molecules increase approximately 100 times compared to the base water.

- **Electrolysis, as an efficient method of applying energy to water, increases the dispersed molecules by approximately 40 times.**

- **After electrolysis, the spacing between the water molecules increase and thereby making the solute more soluble; whereby, it is perceived that the penetration and solubility of water improves.**

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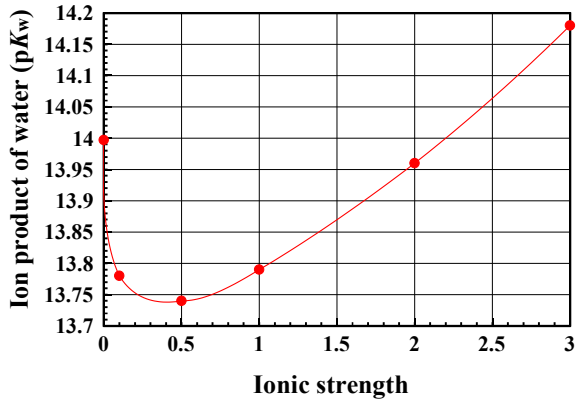
IONIC PRODUCT THEORY AND ITS FUNDAMENTALS

- When energy is added to water and the degree of dissociation changes, the solubility of water also changes.
- When matter is dissolved in water, the degree of dissociation of water itself changes.
- The graph on the right shows the relationship between the degree of dissociation of water and the concentration of water.

HSG269

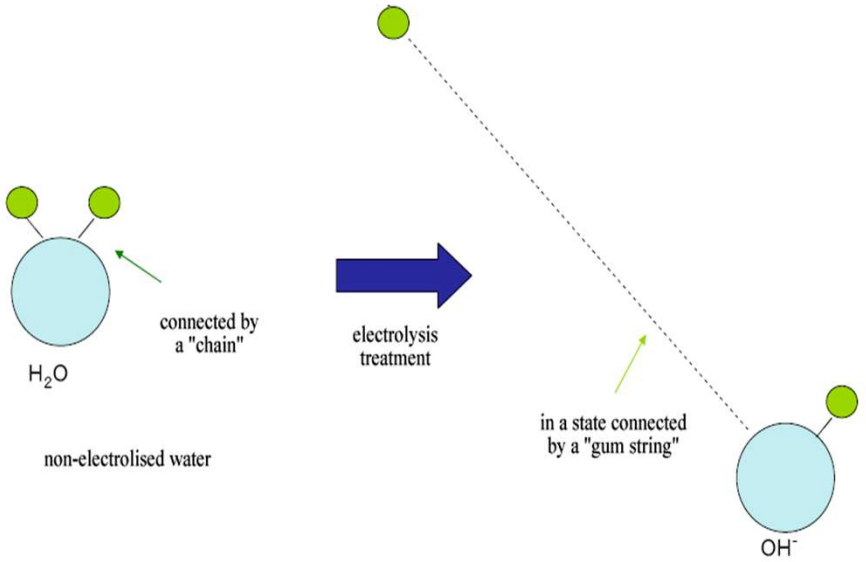
Concentration of Ion Product of water, K_w at 25°C at various ionic strengths of 1-1 electrolytes including $NaClO_4$, NaCl and KCl



ElectroLife NONELECTROLYZED VS ELECTROLYZED

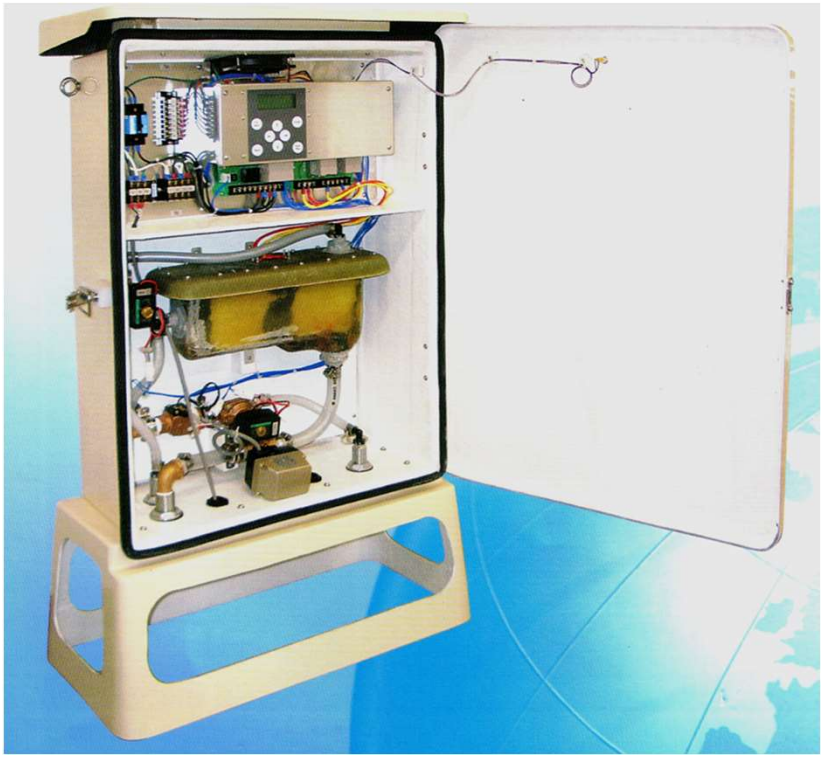
- **The graph on the right indicates that when the concentration is in the weak level (non-electrolyzed state), the ionic strength/concentration is in the range of 0.5 mol/L, whereby the pKw becomes lesser (dissociation of water increases) and the amount of dissolution increases.**

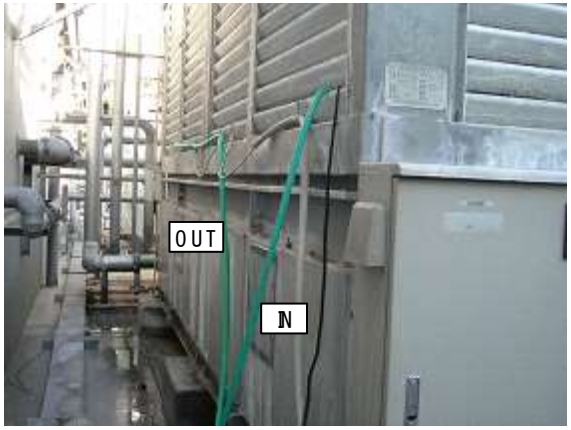
- **The graph indicates that when electrolysis is applied, the pKw level can be lowered and thereby increasing the levels of dissociation and dissolution.**



ElectroLife THE SCALE REMOVAL DEVICE

ElectroLife ITS SIMPLE HOOKUP





ElectroLife COMPARISON TO CONVENTIONAL METHODS

COOLING TOWER MAINTENANCE MODE	SCALE REMOVAL CALCIUM-MAGNESIUM	RUST PREVENTION	LOWERING OF MICROBIAL LOAD	SILICA REMOVAL
ELECTROLIFE PROCESS	EXCELLENT	EXCELLENT	GOOD	EXCELLENT
MAGNETIC AND ELECTRO-MAGNETIC	SEMI EFFECTIVE	NON EFFECTIVE	NON EFFECTIVE	SEMI EFFECTIVE
ION EXCHANGE RESIN	EXCELLENT	NON EFFECTIVE	NON EFFECTIVE	NON EFFECTIVE
LOW CURRENT AC ELECTROLYSIS PROCESS	GOOD	SEMI EFFECTIVE	SEMI EFFECTIVE	SEMI EFFECTIVE

ElectroLife REASON FOR ITS EFFICACY

- **The process applies strong electrical current to produce greater results.**

  -magnets and electro-magnetic methods apply lesser than 1mA of current

  -AC electrolysis method apply 100mA of current

  -ElectroLife applies 10A (10,000 mA) of current

As a result of the stronger electrical current applied, the scale removal occurs through the increase in solubility of the circulation water.

ElectroLife UTILIZING A STRONGER CURRENT

- **A conventional electrolysis approach entails the application of AC-DC current to the electrode. When this approach is used platinum cannot be used as an electrode material. Platinum exfoliates and the lifespan of the electrode is considerably decreased.**
  - **This restriction prevents a stronger electrical current from being applied through the electrolysis process**
- **Additionally, due to the ability of the electrode to utilize DC, an automated 'reverse polarity' process can be applied to remove any scaling that has attached to the electrode while a stronger electrical current is being applied to the circulating water.**

ElectroLife ITS ABILITY TO REMOVE SCALING 1:2

- This is how the pipe appeared prior to the ElectroLife process being applied.
- This is how the pipe appeared after two weeks of exposure to the ElectroLife process.
- This is how the pipe appears after two months of exposure to the ElectroLife process.

ElectroLife ITS ABILITY TO REMOVE SCALING 2:2

UPPER LEFT: Shows copper piping prior to the ElectroLife process.

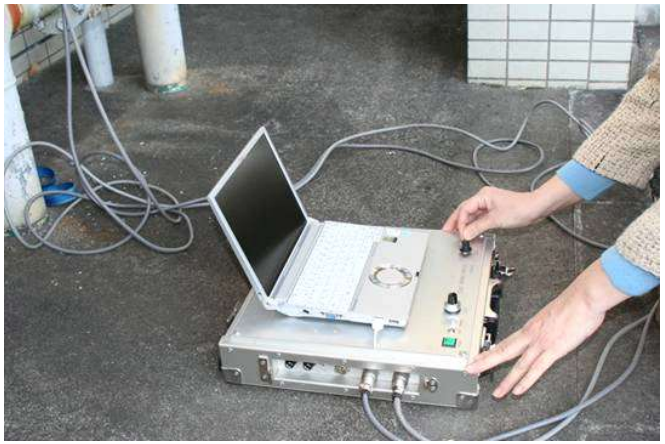
UPPER RIGHT: Shows copper piping 2 months later after the ElectroLife process had been applied.

CENTER LEFT: Shows a different view of the piping material, after having the fins removed from in between the piping. Indications are that the scaling is softening on the piping.

CENTER RIGHT: Shows how the copper piping was easily washed down to remove the softened scaling.

BOTTOM; Shows the status of the piping after the ElectroLife process freed the scaling and the washing down of the piping removed the softened scaling.

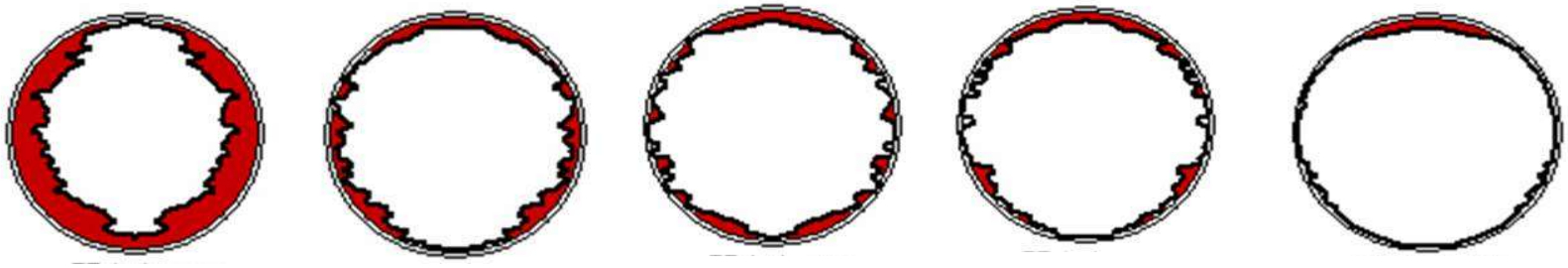
ElectroLife X-RAY MEASUREMENTS OF SCALING 1:5



In conjunction with the computer analysis, this device x-rays the present state of blockage.

In conjunction with the x-ray device, the software measures the amount of blockage.

ElectroLife X-RAY MEASUREMENTS OF SCALING 2:5



35% Blockage
PRIOR TO ELECTROLIFE

13% Blockage

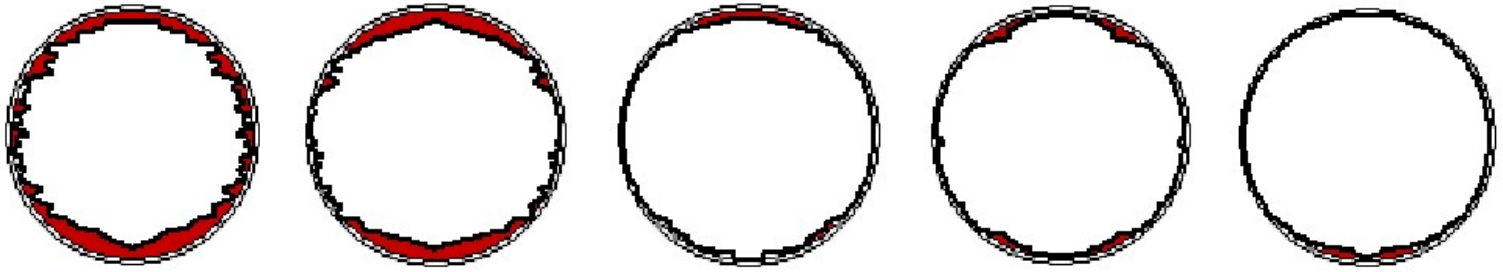
12% Blockage

10% Blockage

3% Blockage

This progression shows how the scaling is being reduced after exposure to the ElectroLife process.

ElectroLife X-RAY MEASUREMENTS OF SCALING 3:5



17% Blockage
Prior to ElectroLife

12% Blockage

4% Blockage

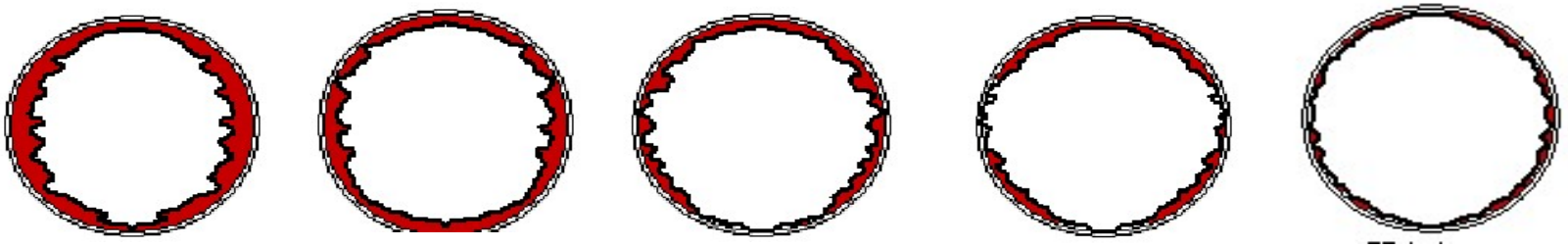
4% Blockage

2% Blockage

- This progression shows how the scaling is being reduced after exposure to the ElectroLife process.

ElectroLife

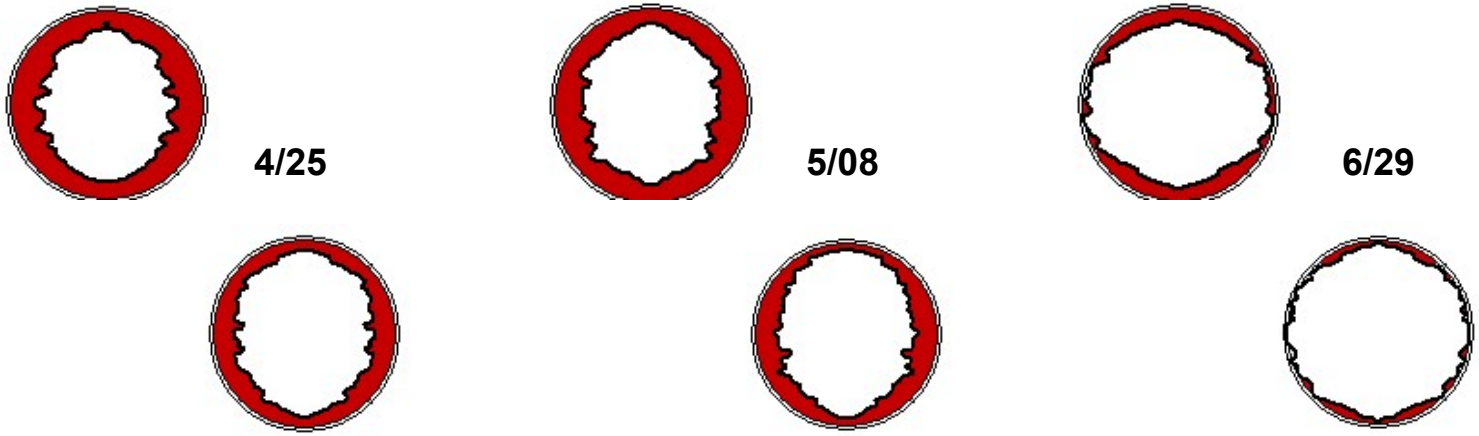
SCALING REMOVED THROUGH THE PROCESS 4:5



26% Blockage	20% Blockage	15% Blockage	12% Blockage	9% Blockager
08.02.14	08.03.13	08.04.23	08.05.15	08.06.19

- **The above condition indicates the dispersion of scaling, after a four month period, with the application of the ElectroLife process. The chemical treatment was terminated at the start of the ElectroLife process.**
- **One can see the improvement that was made from a 26% blockage to a 9% blockage over a four month period.**

ElectroLife SCALING REMOVED FROM THE PROCESS 5:5



- **The above conditions indicate the dispersion of scaling, after a two month period, with the application of the ElectroLife process. The chemical treatment was terminated at the start of the ElectroLife process. Prior to the ElectroLife process, the chemical treatment was used for approximately 10 years.**

ElectroLife EXPERIENCE AT ENKEI WHEEL 1:3

- **Enkei wheel is in the aluminum foil manufacturing business and assembles after-market alloy wheels and is an established global brand.**

  This client's needs are focused on the efficient operation of the cooling tower process to ensure that an effective cooling function is applied to the aluminum alloy.

  Under a normal cooling application, the entrance to the waterways for the outer moldings have a tendency of scale blockage occurring during every 2 weeks of use.

  The installation of the ElectroLife process lessened this blockage occurring from a frequent 2-week period to an 8-week period. As a direct result of this minimized tendency for scale blockage, Plant Management noticed a 75% decrease in their Quality Control rejection rate. Their past rejection rate was at 8% of production which had been drastically reduced to 2% of production.

  The direct valuation of the reduction to this defect-based rejection rate equates to $800,000.00 per year per factory.

ElectroLife EXPERIENCE OF SUZUKI 2:3

- **Suzuki is in the automobile manufacturing business and is an established global brand.**
- **This client's needs are focused on maintaining an efficient cooling process within the equipment utilized for the cooling of paint based upon an electro-disposition coating function.**
- **Under a normal cooling application, significant amounts of scaling was attached to the narrow copper tubing located inside the direct vent cooling system tower.**
- **The installation of the ElectroLife process, and in a short 2-week period, the scaling attached to the narrow tubing significantly softened, and through a simple water-spraying cleaning method, all of the scaling was able to be removed. Additionally, as a result of the ElectroLife exposure, a scale-free condition prevailed.**
- **Historically, once every three years, a one-week period was spent disassembling and chemically cleaning the copper piping. The cost to this conventional cleaning process was approximately $20,000.00 when the ElectroLife-based cleaning process was approximately $2,000.00 resulting in a 90% savings. Since then the scaling was reduced to a near-zero level and the savings in cleaning costs continue to date.**

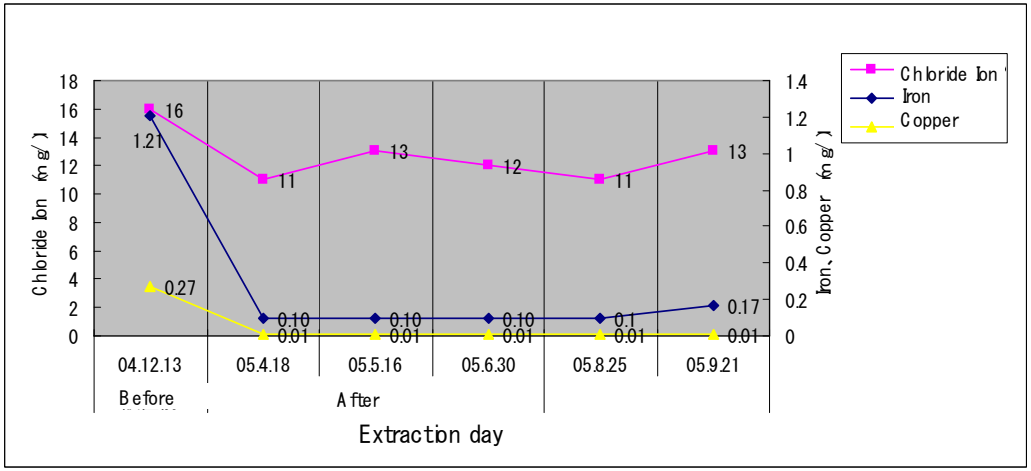
ElectroLife EXPERIENCE OF YAMAHA 3:3

- **Yamaha is in the business of manufacturing ocean-going ships.**

  This client's needs are focused on maintaining an optimal temperature in the operating oil for the presses. The objective was to control the temperature build up in the oil. Each time the oil heated up above the tolerant temperature, the oil needed replacing which cost $10,000.00 per replacement.

  This problem was most prevalent in the Summer months. In conjunction to the oil temperature concerns were the standard issues that cooling system inefficiencies had created. These concerns were mitigated with the introduction of the ElectroLife process providing a nearly scale free condition.

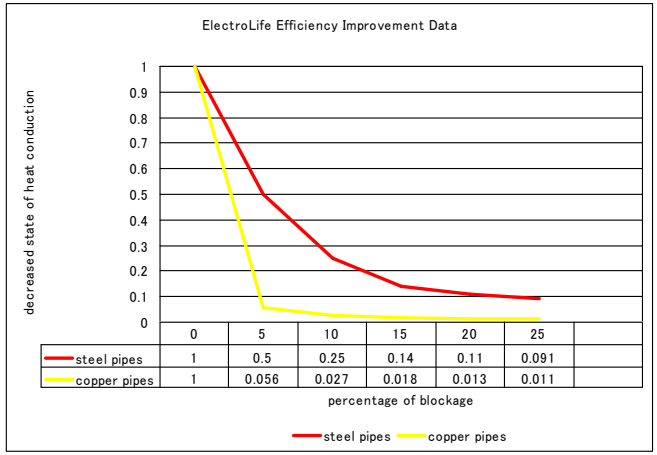
ElectroLife ITS ANTI-RUST EFFECT



This chart shows how the corrosion level of the piping had been lowered and how lesser amounts of iron and copper ions were found in the water after treatment with the ElectroLife process.

This progression, from right to left, indicate how the rust level was reduced over a 2 month period.

ElectroLife EFFICIENCY IMPROVEMENT DATA



- **The graph shows the percentage of calcium carbonate scales in a 10xt 1mm steel and copper pipes and the decrease in the heat conduction when the pipes are blocked.**
- **The *x-axis* indicates the percentage of blockage.**
- **The *y-axis* indicates the decreased state of heat conduction.**
- **As an example, when 5% of scaling attaches to the copper pipe, there is a 0.056 difference than when scaling is not present.**

ElectroLife CO_2 and ELECTRICITY REDUCTION

LEVEL OF BLOCKAGE	RESULTANT POWER LOSS	ANNUAL LOSS IN DOLLARS	ANNUAL CO_2 CONVERSION
PIPE #100A WITH 58%BLOCKAGE	3.1 KW	$49,100.00	118 TON/YR
PIPE #125A WITH 73% BLOCKAGE	3.4 KW	$53,860.00	130 TON/YR

- The chart indicates the condition when scaling is attached to the water ways creating the blockage of pipes and resulting in a heavy load onto circulation pumps equating to a larger use of energy.
- The specifications of the circulation pipe was 100 meters in length, water circulating over 220 days per year at 8 hours per day with a KWH of electricity costing $0.15

ElectroLife

OPERATIONAL COSTS OF THE PROCESS WHEN COMPARED TO CONVENTIONAL PROCESSES

TREATMENT METHOD	ANNUAL OPERATIONS COST	CHARACTERISTICS
ELECTROLIFE PROCESS **Updated 03/16/2017** **Paul E. Seaver**	**-Electrical power consumption = 400W** **-Electricity charge = $270.00** ***(as tested individual markets may vary)*** **-Electrode wear = $3,000.00.00** ***(Electrode life average 1 ½ years)*** **-Total expenditure = $3,270.00** **-Actual Result Conversion $3,270.00/1 = $3,270.00**	**-Shows remarkable scale removal and rust inhibiting ability.** **-Through the ElectroLife process, condensation of the circulatory water can be controlled.** **-Through the minimized oxidizing ability of the circulatory water, piping is protected from corrosion.**
ELECTROMAGNETIC PROCESS	-Electrical power consumption = 200W -Electricity charge = $1,400.00 -Actual Result Conversion 1,400.00x50= $70,000.00	-Due to the low energy that is provided to the circulatory water, the descaling effect is low.
MAGNETIC PROCESS	-Electrical power consumption = $0 -Actual Result Conversion $0 = $0	-Due to the low energy that is provided to the circulatory water, the descaling effect is low. -Although the operational expenditure, aside from the initial capitalization for the magnet(s) is $0, there is a question as to whether it is even beneficial to installing the magnet(s).
ION EXCHANGE PROCESS	-Electricity charge = $30.00 -Electrolyte (salt) charge = $55.00 -Resin consumption charge =$600.00 -Total expenditure = $685.00 -Actual Result Conversion=1,180,000x8 = 9,940,000	-Due to the difficulties associated with removing silica buildup in equipment, even the use of strong chemicals do not produce effective results.
LOW CURRENT AC ELECTROLYSIS PROCESS	-Electricity charge = $100.00 -Electrode wear = 600.00 -Total Expenditure = $700.00 -Actual Result Conversion = $700 x 6 = $4,200.00	-Due to the weakness in the amount of electrolysis applied, the amount of descaling that occurs is lesser.
CHEMICAL TREATMENT	-Monthly expense = $500.00 -Annual expense = $6,000.00 -Total expenditure = $6,000.00 x 2 = $12,000.00	-There is an environmental issue in the use of chemicals.

ElectroLife FEATURES OF THE DEVICE AND PROCESS

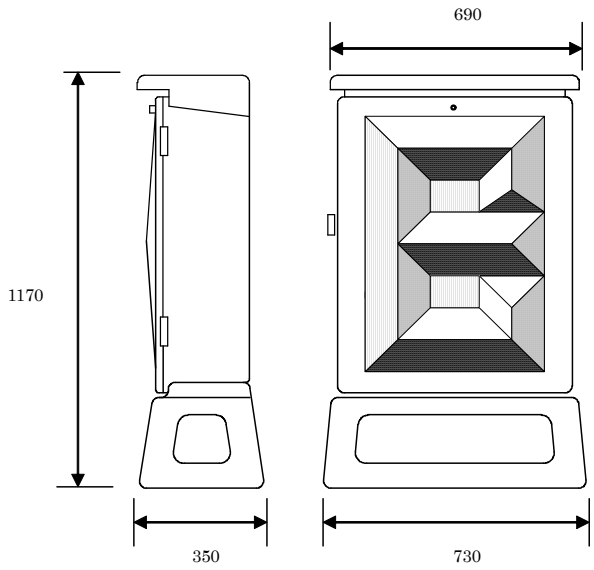
1.Compared to other electricity-applying devices, the ElectroLife unit and process applies a strong electrical current thereby increasing the solubility of the circulation water.

2.Based upon the level of electrical conductivity (EC) that is sensed by the software controlling the ElectroLife process, when a heavy level of scaling is liberated and floating in the circulatory water, the automated drain process is activated and the scaling sent to drain.

3.The timing of the switching of the electrical polarity coupled to the interval of the drain function and coupled to the overall strength of the electrolysis that is applied to the circulatory water can be easily monitored and controlled through a LED screen.

4.The overall maintenance to the unit and its functions are of a very low nature and non-technical in difficulty.

ElectroLife THE DEVICE AND ITS SPECIFICATIONS



DESCRIPTION:	A single cabinet device. Cabinet made of framing enclosed in fiberglass. Unit to sit on firm footing such as concrete. Cabinet equipped with a front door which covers the inner components. Visible LED control panel located at top portion of the device.
DIMENSIONS:	D=350mm (14”), W=700mm (28”), H=1170mm (47”)
WEIGHT:	40 kg (88lbs)
WATER PRESSURE:	Below 0.04 Mpa (0.4 Kg f/cm^2 ~ 0.2 Mpa (2.0 kgf/cm^2) The pressure resistance of the electrolysis vessel of 0.2 Mpa (2.0 kgf/cm^2)
INPUT POWER SOURCE:	Single phase AC 100V~240V, 50/60Hz
MAXIMUM POWER CONSUMPTION	800W (Main Frame Maximum of 600W)
WATER TREATMENT METHOD:	Electrolysis. (Maximum of 10A, Preset Arbitrary Electrical Current) Once scaling is removed 10A is reduced to 5 A.
MAXIMUM FLOW:	25 liters (6.6 gallons) per minute
ELECTROLYSIS VESSEL SYSTEM:	Continuous flow
LIFE DURATION OF ELECTRODE:	Approximately 1.5 years Life duration is dependent on the quality of water.
WATER SUPPLY, FLUSH, DRAINAGE PIPE RADIUS:	Water supply = 1/2B Hose Nipple, Flush & Drainage = 3/4B Hose Nipple