



Fluid Dynamics

Hard water solutions since 1973

MagCAT[®]

Preventing scale build up in sugar processing plants

Fluid Dynamics has had great success with the prevention of scale in sugar processing plants as many case histories have shown. Installations in Belgium have achieved significant reductions in scale accumulation. The nature of the problem can make complete prevention difficult but in all cases considerable improvements have been made.

The reduction or elimination of scale formation following the installation of a Fluid Dynamics MagCAT[®] increases the time between planned maintenance inspections and cleaning. With its Active Catalytic Surface and magnetic fields the MagCAT[®] provides the most powerful physical anti-scaling treatment available.

Typical Results:

- Reduced scale on evaporators
- Reduced chemical usage
- Reduced scale accumulation in pumps





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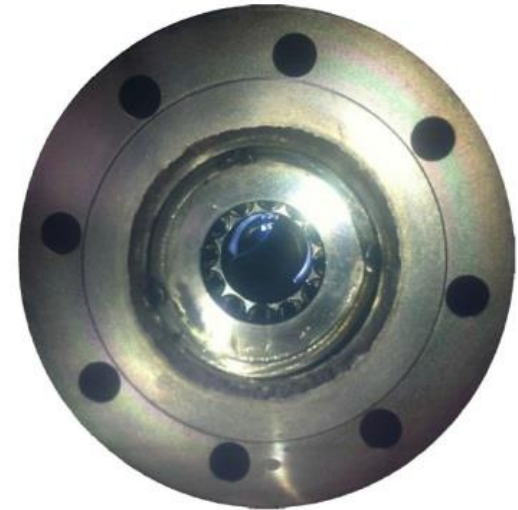
A pivotal point in the manufacture of raw cane sugar is the evaporation process that transforms the juice.

Evaporator efficiency and shutdowns for evaporator cleaning are two major cost components in the operation.

Formation of scale in sugarcane juice evaporators inhibits heat transfer lowering the efficiency of the evaporators reducing throughput.

Scale accumulation can lead to lengthy shutdowns for cleaning with costly chemicals.

The MagCAT treatment is effective on cane juice or low Brix sweetwater, but not on high viscosity syrups.





MagCAT[®]

MagCAT Case Study Samples: Sugar Processing Plant

Before grinding, three MagCAT units were installed on a large set of triple evaporators (43,000 sq.ft. surface). Unit size was determined according to the pipe diameter on which they were working.

Observations and Discussion

The regular period between boil-outs prior to the installation of the MagCAT system had been 80,000 tons of cane or every 7 – 10 days.

After the first 10 days (80,000 tons) use with the MagCAT system the first and second evaporators were found to be clean with the third having some scale present but that scale was much softer than that found previously. The evaporators were cleaned and then allowed to run until 120,000 tons of cane were ground, then they were inspected again. The same results were noted. The evaporators were treated and put back into service.

By the close of grinding, 160,000 tons of cane could be milled before the evaporators were taken off line for cleaning treatment. On visual examination the first two evaporators were still very clean. The third body had some scale in it but it was soft and easily removed.

Following installation some 160,000 tons of cane could be processed between cleanings: i.e. the time between boil-outs was extended to 14 – 20 days.





MagCAT[®]

MagCAT Case Study Samples

Sugar Processing Plant	With MagCAT	Without MagCAT
Ash in sugar (season's average (sulfated))	0.26%	0.26%
Ash in molasses (conductivity)		
A molasses	6.34%	6.70 %
B molasses	7.24 %	8.55 %
Final molasses	13.85 %	15.05 %
Sodium hydroxide usage (season)	15,000 gal	41,000 gal
Hydrochloric acid usage (season)	5,300 gal	11,900 gal





MagCAT[®]

MagCAT Case Study Samples: Sugar Processing Plant

Conclusions:

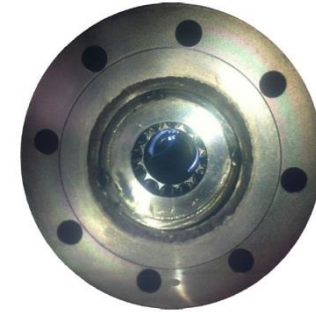
- Boil out frequency (for evaporator cleaning) was cut in half (decreased by 47 %)
- Sodium hydroxide usage and disposal costs were reduced 64 %.
- Hydrochloric acid usage and disposal costs were reduced 55 %
- Ash level in raw sugar produced did not increase when MagCAT was used.
- Ash level in molasses did not increase when MagCAT were used.
- The payback time for the MagCAT could be as little as one season, based on chemical savings and production increases.





MagCAT[®]

MagCAT Case Study Samples: Other



U.K Government Military Installation 2009

Effluent lines from a reverse osmosis, iron removal system and water softener used to scale up every six months requiring pressure jetting of lines and acid cleaning of pumps. Chemicals could not be used as the water was being drained to a stream. Following installation of MagCAT the whole system has not required shutdown for cleans, now over 3 years of continual operation. The plant is currently undergoing expansion and MagCAT has been specified for the next stage following the impressive results.

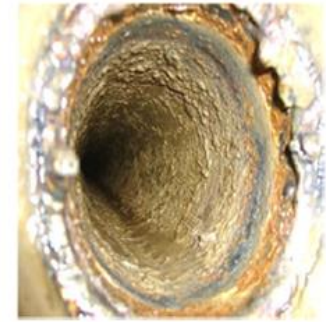
Cotto Tiles, Thai Cement

Cooling water circuit for tile mold making machines. The circuit was heavily contaminated with oil and had silica and calcium deposition in pipelines.

A number of chemical and non-chemical treatments had been tried to prevent the problem but failed. Following installation of MagCat scale ceased to deposit and within just 6 months 70% of the existing scale had been removed.



Prior to installation



6 months of MagCat treatment with over 70% scale removed



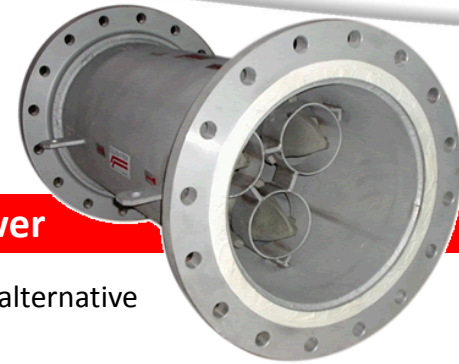


COLLOID-A-TRON[®]

Industrial Scale Prevention

Hard water scale prevention without the use of chemicals or power

16" Unit



Fluid Dynamics provides an industry proven catalytic solution for scale prevention as an alternative to chemicals and conventional ion exchange systems.

The Colloid-A-Tron replaces a section of pipework and can be specified without the need to make provision for floor space or power. The Colloid-A-Tron consists of a non-sacrificial lead free catalytic core made from a special alloy housed within a non-reactive stainless steel (304) tube.

Features:

- Chemical Free and Environmentally Friendly
- No Power Requirement
- No Waste Water
- No Maintenance
- In Cooling Tower applications the use of the Colloid-A-Tron reduces the requirement of biocide/algaecide chemicals by 50% when compared to Cooling Towers that are treated by chemicals alone.
- Scientifically Confirmed Technology
- Uninterrupted Water Flow
- No Magnets
- Product Life Expectancy: Over 10 Years

Technology Backed by Science, Endorsed by Industry[™]





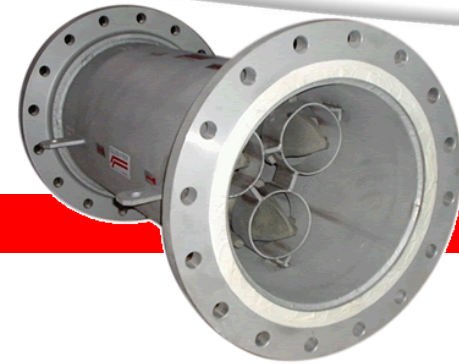
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COLLOID-A-TRON[®]

Industrial Scale Prevention

Case Study: Colloid-A-Tron Delivers Proven Results

16" Unit



Fluid Dynamics 16" Colloid-A-Tron: Fabrica Militar Rio Tercero

In 2005 Fluid Dynamics International supplied a 16" scale prevention system to a customer in Argentina. The unit (pictured here) was installed in a large cooling water system, replacing chemicals as a means of scale prevention.

Over 10,000 units have now been installed in Argentina alone. There is an increasing demand for our technology as plant operator's move away from the use of chemicals and conventional softening products.

FABRICA MILITAR RIO TERCERO is dedicated to the production of high quality chemical products such as nitric acid, sulfuric acid, nitrate of ammonia and ammonia anhydride. These products are supplied to the Argentinean government. They are in a field of their own in the Argentinean chemical business being the only manufacturer of nitric acid in the country.

The Problem: Within the nitric acid plant a very large heat exchanger was supplied water by a SULZER model 3E MB 2300/HD 15 cooling tower with an average flow of 1700m³/h (nearly 1/2 million US gallons per hour). The water within the circuit contained a high level of hardness and scaling was a major issue despite the use of a chemical treatment program. Periodically the system had to be shut down to physically remove scale accumulation.

Algae was also an issue with doses of hypochlorite required at regular intervals just to keep it under control.

Technology Backed by Science, Endorsed by Industry[™]

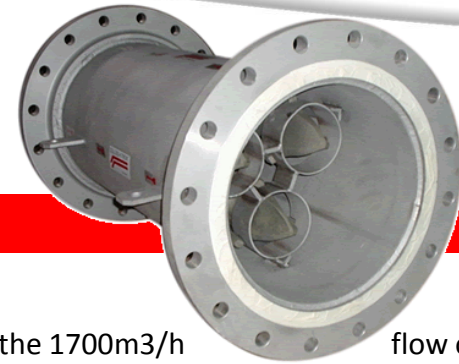




COLLOID-A-TRON[®]

Industrial Scale Prevention

Case Study: Colloid-A-Tron Delivers Proven Results



16" Unit

The Solution:

In April 2005 a custom built Colloid-A-Tron with a diameter of 16" was installed to treat the 1700m³/h flow of water within the recirculating circuit. After several months it was clearly noticeable that the previous hard scaling was not forming as before. In addition pre-existing scale had diminished. The other significant point was that the algae presence was reducing allowing for the reduction of hypochlorite dosing.

The Savings:

A year after the installation of the Colloid-A-Tron a second review was carried out. It was noted that the results continued to be very good. Cleaning the soft chalk like deposits that occasionally built up was much easier than before. Use of chemicals to deal with the scaling problems had been completely eliminated saving substantial amounts of money and also preventing damage to the environment.

In addition it was no longer necessary to carry out shutdowns for cleaning saving on production losses.

The algae control also saved the company a large amount in chemical treatment with the use of hypochlorite reduced by 50% and this was expected to be reduced further.

Fabrica Militar estimated that the payback on their 16" Colloid-A-Tron investment would be less than two years representing a return on investment of at least 50% each year. This ignored the likely extension of the systems working life due to the reduced use of aggressive chemicals.

Update(2013): This system has now been in place for nearly 8 years with no issues. This long term scale prevention has been achieved without the use of chemicals.

Technology Backed by Science, Endorsed by Industry™





Expert 5

Fluid Dynamics has a computer simulation system we call Expert 5 which can take a water analysis and predict its scaling rate and how effective our product is on a certain water. It's similar to simulators used by oil companies to determine the rate of scaling in their oil wells but ours is adapted to calculate the effect our technology has on suppressing the formation of scale.

Developed using data from literally thousands of different water systems, it has given us a **100% success rate** at predicting the effect.

We can take a raw water analysis and predict its behavior in various cycles through a system, how severe it will scale and how effective our treatment will be. Importantly it will calculate the optimum cycles of concentration (COC) the water in the system should be set at.

Just to refresh, cycles of concentration is the ratio of chloride concentration in the circulating water compared to the raw feed water. The introduction of fresh water is essential, as in a cooling tower water will evaporate and minerals such as calcium do not. As a result the ratio of minerals will become greater and greater as more and more water evaporates, eventually after enough cycles and no introduction of fresh water you will just have a sludge dropping scale everywhere.

Setting the cycles for a cooling tower helps maintain the perfect combination, a scale free system with as little water consumption as is possible.

With all water circuits there will be a complex set of either softeners chemicals or just chemicals. It is very rare that we see an effective combination of the two when it comes to preventing scaling for hard water. For example, Fluid Dynamics sold equipment to Europe's largest beef processor and they were using chemicals in their evaporative chillers that were still full of scale. Using Expert 5 readings that indicated a positive outcome equipment was specified and a significant impact on the scale issue has been achieved AND chemical dosing has been significantly reduced.

The following tables show the information required for use of the Expert 5 simulator





Information Required for Expert 5 Analysis: Single Pass (1 of 2 slides)

1. Single Pass (e.g: water heater, calorifier)			
System name/ description:	<input type="text"/>		
Water			
Flow rate to be treated:	<input type="text"/>		
Water source:	<input type="radio"/> River	<input type="radio"/> Town	<input type="radio"/> Well/Borehole
	<input type="radio"/> Sea water	<input type="radio"/> Lake	
System			
Feed Water temperature:	<input type="text"/>	state °C or °F	
Estimated Temperature of Heat Exchanger Surface to be Cooled:	<input type="text"/>	state °C or °F	
Equipment to be protected (e.g. compressors, cooling tower, water heater):	<input type="text"/>		
Material of pipework:	<input type="text"/>		
Pipework diameters(s):	<input type="text"/>		





Information Required for Expert 5 Analysis: Single Pass (2 of 2 slides)

Water Analysis	
Element	Raw water
Total alkalinity (cac03) as ppm	<input type="text"/>
Chlorides, Cl (ppm)	<input type="text"/>
Sulphites, SO4 (ppm)	<input type="text"/>
Total hardness (cac03) ppm	<input type="text"/>
Ca hardness (ca) as ppm	<input type="text"/>
Magnesium (mg) as ppm	<input type="text"/>
Ph	<input type="text"/>
Total Dissolved solids	<input type="text"/>





Information Required for Expert 5 Analysis: Re-circulating systems (1 of 3 slides)

2. Re-circulating systems (e.g: cooling towers)			
Water			
Flow rate to be treated:	<input type="text"/>		
Water source:	<input type="radio"/> River	<input type="radio"/> Town	<input type="radio"/> Well/Borehole
	<input type="radio"/> Sea water	<input type="radio"/> Lake	
System			
Feed Water temperature:	<input type="text"/>	state °C or °F	
Estimated Temperature of Heat Exchanger Surface to be Cooled:	<input type="text"/>	state °C or °F	
Equipment to be protected (e.g. compressors, cooling tower, water heater):	<input type="text"/>		
Material of pipework:	<input type="text"/>		
Pipework diameters(s):	<input type="text"/>		
Current frequency of descaling:	<input type="text"/>		





Information Required for Expert 5 Analysis: Re-circulating systems (2 of 3 slides)

Water Analysis		
Element	Raw water	Recirculating
Total alkalinity (cac03) as ppm	<input type="text"/>	<input type="text"/>
Chlorides, Cl (ppm)	<input type="text"/>	<input type="text"/>
Sulphites, SO4 (ppm)	<input type="text"/>	<input type="text"/>
Total hardness (cac03) ppm	<input type="text"/>	<input type="text"/>
Ca hardness (ca) as ppm	<input type="text"/>	<input type="text"/>
Magensium (mg) as ppm	<input type="text"/>	<input type="text"/>
Ph	<input type="text"/>	<input type="text"/>
Total Dissolved solids	<input type="text"/>	<input type="text"/>
Cooling Tower	Units of Measurement	
Pipe Diameter	<input type="text"/>	<input type="text"/>
Tower Volume	<input type="text"/>	<input type="text"/>





Information Required for Expert 5 Analysis: Re-circulating systems (3 of 3 slides)

Cooling Tower	Units of Measurement			
Circulation Flow rate				
Make up water flow				
Bleed %				
Continuous Yes / No				
Working Time	Hrs or Days			
Surface Temp at heat exchange				
System Pressure				
Problems encountered in tower: Scaling: <input type="checkbox"/> Corrosion: <input type="checkbox"/> Biological Growth: <input type="checkbox"/> Oil Contamination: <input type="checkbox"/> (check problems)				
Frequency of cleans?				
Current Water Treatment	Chemical Used	Chemical Used	Chemical Used	Other Treatment? e.g. Softener / R.O.
Tower				





Information Required for Expert 5 Analysis: Low Pressure Steam Boilers

Note:

Steam boilers, due to their operating pressures and temperatures, are considered to be a special case due to liability issues.

Fluid Dynamics has a policy of only treating steam boilers that are showing visible evidence of scaling issues.

Please consult with a company principal if you have any questions or problems.

3. Low Pressure Steam Boilers: Water Treatment		
Element	Raw water	
Total alkalinity (caco3) as ppm		
Chlorides, Cl (ppm)		
Sulphites, SO4 (ppm)		
Total hardness (caco3) ppm		
Ca hardness (ca) as ppm		
Magnesium (mg) as ppm		
Silica as ppm		
Ph		
Operating pressure		state bar or psi
Percent of condensate return		state bar or psi
Operating pressure		state bar or psi
State Chemicals used and purpose		
Material of pipework		
Pipework diameters(s)		
Amount of Steam produced		state unit of measurement
Current frequency of descaling		





Fluid Dynamics

Hard water solutions since 1973

Track record of success in the Food & Drink Industries

Fluid Dynamics has recently worked with a number of companies in the Food & Drink Industry providing effective solutions to hard water problems coupled with a fast return on investment. Our client list includes:

Coca-Cola Bottling Plants

DSM Bakery Ingredients Cooling Systems

Kellogg's Manufacturing Plants

Unilever Hot Water Boilers

Nestle Cooling Towers

Sucrerie Tirlemont Washers/Boilers/Strippers

Sucrerie Wanzes Washers/Boilers/Strippers

Brazil & Ireland

Brazil, Argentina, UK

Germany & Mexico

Argentina

Switzerland

Belgium Sugar Companies

Belgium Sugar Companies

