Fluid Dynamics
Hard water solutions since 1973

Scale Prevention for Compressors

Maintaining Efficiency and Reducing Costs

Scale caused by hard water

Scale formation inside compressors is caused by the deposition of calcium carbonate from hard water that is used to cool the compressor.

As the water draws heat from inside the compressor a thick crust of scale builds up inside the water pipes. The scale insulates the piping decreasing the efficiency of the heat exchange.

As the scale deposition increases the pipe capacity decreases reducing the amount of water supplied to the compressor and can even eventually lead to pipe blockages.

How does it affect the operation

The accumulation of scale causes a number of problems. The first is the cost of chemicals that are used to reduce the amount of scale forming and to remove deposited scale.

The chemicals used bring health and safety risks as employers must abide by stringent handling procedures to avoid potentially fatal incidents.

Furthermore scale formation will decrease the efficiency of the compressors heat exchanger resulting in an increase in running costs and losses in production when the equipment is shutdown for cleaning.

Installation

Installation of Colloid-A-Tron manufactured by Fluid Dynamics installed in the supply of water cooling the compressor

Compared to traditional methods of manual removal of scale and chemical dosing systems Fluid Dynamics equipment is very simple to install and operate. Our equipment comes in the form of a tubular unit, the diameter of which depends on the flow. The unit is installed in the cooling circuit replacing a small section of pipe leading to the compressor. Once installed there's no requirement for earthing or bonding, no need for a power supply and no water is wasted during our treatment process.

Perhaps most important of all is our treated water does not use chemicals so water does not need to be treated before it is disposed of.

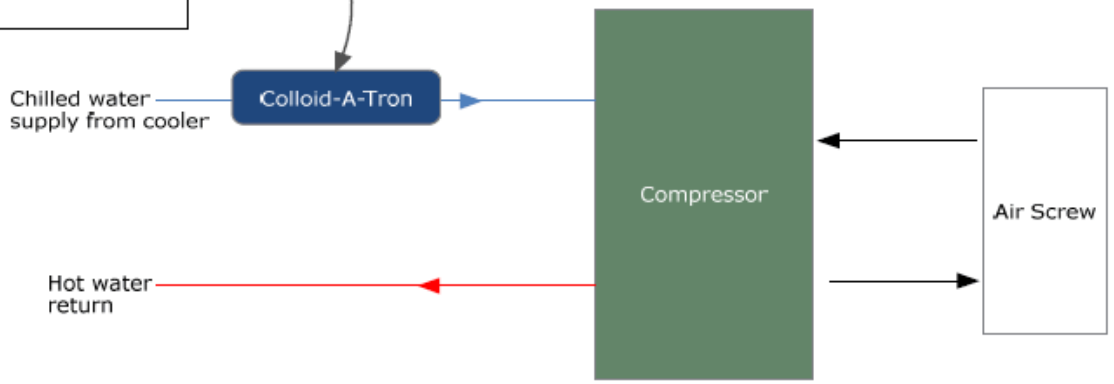
Typical Installation Example

Colloid-A-Tron unit installed on chilled water supply to Compressor.

This unit can be installed in either a horizontal or vertical position.

The equipment is sized based on the flow rate of water supplied to the compressor.

Equipment is either supplied with threaded ends or flanges for installation.



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Case Study

Honda (Thai)

Colloid-A-Tron Treatment for

Compressor After-Coolers

The Customer

Thai Honda, has operated in Bangkok since 1965, manufacturing automobiles, motorcycles & power tools for the Asian market

The Problem

Compressors & Air Dryers at Thai Honda

A series of 220 KW air compressors and air dryers generating compressed air which is used to power various equipment throughout the plant.

Due to the energy produced the equipment generates a large amount of heat and cooling water is continuously circulated through the equipment to control the temperature.

The Problem

Feed Line to compressors with scale deposition

Compressor after cooler with scale

Despite a costly softening and chemical dosing system treating the water before it is used for cooling, pipelines and the compressors were suffering from scale deposition.

The compressors required regular maintenance to remove the scale deposits and there were considerable pressure losses throughout the system due to scale build up.

Once scale starts to form there is an increases in the work load of the pumps as pressure losses increase resulting in a increase in the amount of power required to pump the water round the system.

The Problem

Scale formation inside any water system will bring a host of additional running costs and Thai Honda were no exception.

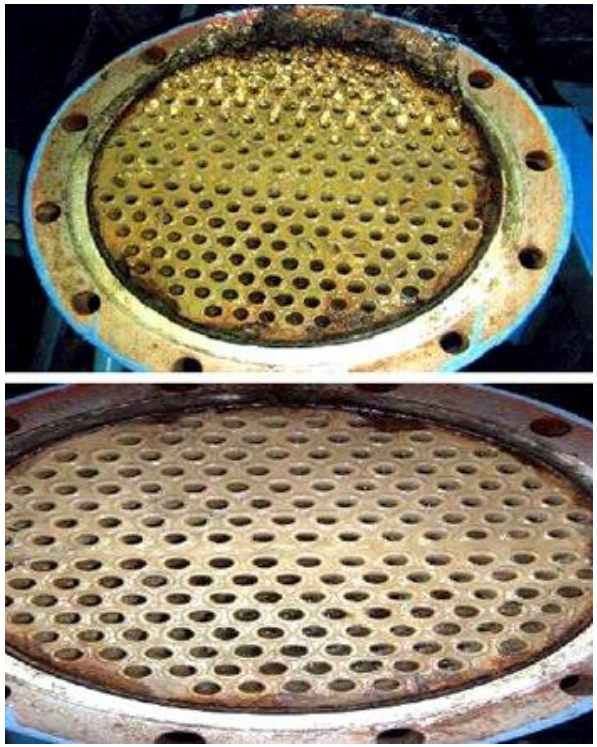
- Cost of current failed chemical and softening system, regular purchase of chemicals and salt, regular maintenance and replacement of parts
- Cost of removing existing scale deposits
- Scale build up incurred pressure losses of 68% throughout the system, resulting in an increase in running costs of pumps

Installation

One of the compressors was chosen for the purposes of a trial to assess the performance and impact a Colloid-A-Tron would have in this system.

On November 21st the Colloid-A-Tron was installed on the feed line to the compressor under supervision by Honda

The Results



The trial was due to be assessed over a 6 month period but after within four weeks the engineers had noticed remarkable improvements on the reduction of pressure losses within the system. Data had been collected before and during the trial and this was analyzed and Honda produced figures showing a reduction in pressure losses from 68% down to 45%.

This meant a decrease of 6.6% in power usage of the pumps. As one can see from the photo of the compressor not only has scale been prevented but existing scale has been removed returning the compressor to the desired condition in order for it to operate at maximum efficiency.

The following page shows the data amassed by Honda showing their reduction in energy use.

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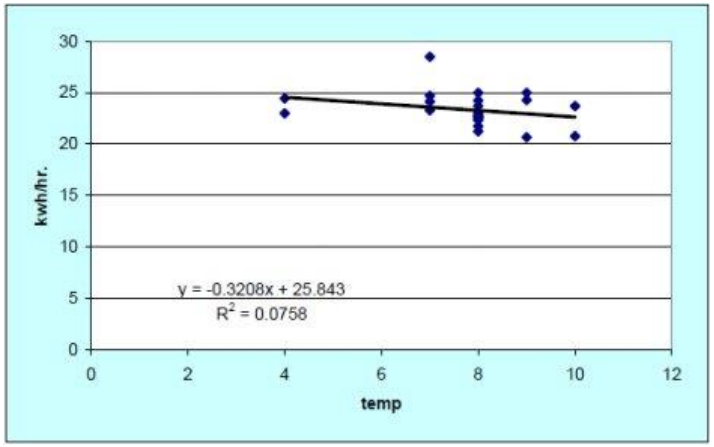

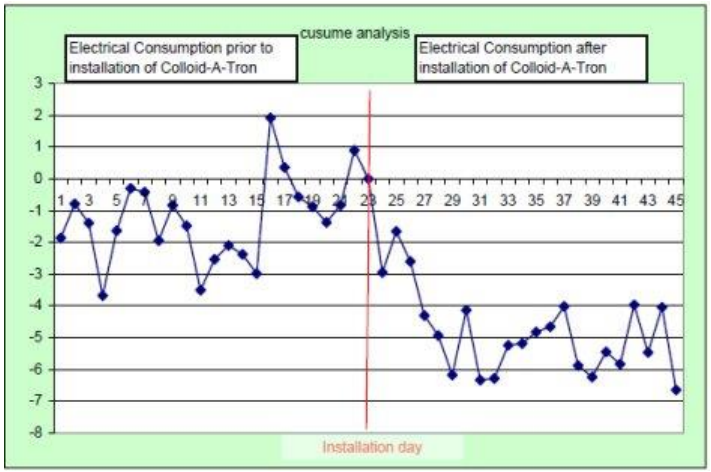

Thai - Honda เวลา ทุกช่วงเวลา

Day	Temp	Kwh/hr.	Kwh/hr.-P	Diff. Kwh/hr.	Cusum
1	10	20.78	22.635	-1.855	-1.855
2	10	23.71	22.635	1.075	-0.78
3	8	22.67	23.2766	-0.6066	-1.3866
4	9	20.67	22.9558	-2.2858	-3.6724
5	9	25.00	22.9558	2.0442	-1.6282
6	9	24.29	22.9558	1.3342	-0.294
7	4	24.44	24.5598	-0.1198	-0.4138
8	8	21.75	23.2766	-1.5266	-1.9404
9	7	24.71	23.5974	1.1126	-0.8278
10	8	22.63	23.2766	-0.6466	-1.4744
11	8	21.25	23.2766	-2.0266	-3.501
12	8	24.25	23.2766	0.9734	-2.5276
13	8	23.71	23.2766	0.4334	-2.0942
14	8	23.00	23.2766	-0.2766	-2.3708
15	8	22.67	23.2766	-0.6066	-2.9774
16	7	28.50	23.5974	4.9026	1.9252
17	4	23.00	24.5598	-1.5598	0.3654
18	8	22.35	23.2766	-0.9266	-0.5612
19	7	23.29	23.5974	-0.3074	-0.8686
20	8	22.78	23.2766	-0.4966	-1.3652
21	7	24.14	23.5974	0.5426	-0.8226
22	8	25.00	23.2766	1.7234	0.9008
23	8	22.38	23.2766	-0.8966	0.0042
24	8	20.33	23.2766	-2.9466	-2.9424
25	8	24.57	23.2766	1.2934	-1.649
26	8	22.33	23.2766	-0.9466	-2.5956
27	9	21.25	22.9558	-1.7058	-4.3014
28	9	22.33	22.9558	-0.6258	-4.9272
29	9	21.71	22.9558	-1.2458	-6.173
30	9	25.00	22.9558	2.0442	-4.1288
31	9	20.75	22.9558	-2.2058	-6.3346
32	8	23.33	23.2766	0.0534	-6.2812
33	9	24.00	22.9558	1.0442	-5.237
34	8	23.33	23.2766	0.0534	-5.1836
35	10	23.00	22.635	0.365	-4.8186
36	8	23.44	23.2766	0.1634	-4.6552
37	5	24.88	24.239	0.641	-4.0142
38	5	22.38	24.239	-1.859	-5.8732
39	9	22.59	22.9558	-0.3658	-6.239
40	9	23.75	22.9558	0.7942	-5.4448
41	8	22.89	23.2766	-0.3866	-5.8314
42	12	23.86	21.9934	1.8666	-3.9648
43	8	21.78	23.2766	-1.4966	-5.4614
44	9	24.38	22.9558	1.4242	-4.0372
45	8	20.67	23.2766	-2.6066	-6.6438
	ก่อนติด	536.97	536.9658		
	หลังติด	502.55	509.20		

Companies who have installed Fluid Dynamics equipment on Compressors

ONGC....sea water fouling on rig mounted compressors:

ONGC opted to trial the effectiveness of COLLOID-A-TRON on preventing fouling in the cooling systems of their rig-mounted compressors. Having identified a suitable site for testing, a program was set up to assess the COLLOIDA-TRON'S effectiveness. Sea water has very high levels of hardness and causes large amounts of scale to deposit inside the equipment it passes through. Removing this scale involves a costly procedure of shipping the chemicals that are required to the oil rig and taking the compressors off-line to clean them.

Two separate compressors were identified and used for the trial. Their performance was monitored.

Compressor number one operated between 17th May 1992 and 18th February 1993. During that time it ran for 455 hours and needed cleaning seven times, a frequency of every 65 hours.

Compressor number two was monitored from 18th August 1992 up to the17th February 1993
During this period it ran for 2152 hours and required cleaning 16 times. The mean time between cleanings was 172 hours.

Following this period of observation a 4" and 8" COLLOID-A-TRON were fitted to the cooling water inlets of the two compressors on the 18th February 1993.

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Companies who have installed Fluid Dynamics equipment on Compressors

ONGC....sea water fouling on rig mounted compressors:

Compressor number one ran for 645 hours between the 18th February 1993 and the 17th May 1993. During that period it required only 4 cleans extending the time between each clean from 65 hours to 163.5 hours.

Compressor number two ran for 1470 hours in the same period, and this equipment also required only four cleans during the test - thus extending the mean life between each clean from 172 operating hours to 367 operating hours. Savings were not only made in manpower hours - savings were also made in downtime, the reduction of the amount of cleaning chemicals needed to be shipped to the rig and a substantial increase in the number of hours that the compressors can be in service.

Compressor Number one

Without Colloid-A-Tron / With Colloid-A-Tron	
Running Hours	455 / 645
Number of Cleans	7 / 4
Mean Time Between Cleans (hrs)	65 / 163.5
Percentage Increase in Running Time:	**151%**

Compressor Number two

Without Colloid-A-Tron / With Colloid-A-Tron	
Running Hours	2125 / 1470
Number of Cleans	16 / 4
Mean Time Between Cleans (hrs)	172 / 367.5
Percentage Increase in Running Time:	**112%**

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Companies who have installed Fluid Dynamics equipment on Compressors

PFIZER: Treating Heat Exchangers on Multi-Stage Compressors

Many companies use chemical inhibitors to reduce the amount of scale that forms inside their water systems, but despite these measures scale formation still takes places in the majority of systems. Further chemicals are then required to remove scale deposits from inside the equipment and the pipes. This was the case for a Pfizer plant in Dagenham, London who despite treatment required weekly shutdowns to clean the heat exchanger in their multi stage compressor circuit. A 3'' Colloid-A-Tron was installed on the water supply line to the heat exchanger and since installation no scale has formed and shutdowns and chemical cleans are a thing of the past. Below is an example of what a customer would save when using Colloid-A-Tron.

Example: Weekly cost of chemical treatment

Chemical cost	£250
Labor cost	£125
Chemical disposal cost	£75
Health & Safety Precautions	£50
Weekly Cost	£500

Example: Colloid-A-Tron Return on Investment

Cost of chemical treatment per year	£6000
Cost of Colloid-A-Tron purchase	£4500

In this example Colloid-A-Tron returned on its investment in 8 months based on the cost of cleaning the equipment.

Companies who have installed Fluid Dynamics equipment on Compressors

Columbian Chemicals: Preventing scaling in compressors for 29 years

Prior to installing Colloid-A-Tron's in the compressor circuits, the compressors required cleaning twice every month to remove the deposition of scale. Since 1980 a number of units have been installed due to the success of keeping the equipment totally scale free. The first unit installed was a 3" Colloid-A-Tron followed by a 1½" Colloid-A-Tron the following year. In 1990 a further three units were installed including 2 x 1½", 1 x 1" and 1 x 1¼ Colloid-A-Tron units. The most recent unit commissioned in 2008 was a 4" Colloid-A-Tron which is testament to the success of the treatment on the compressors. Since installation of the first unit not a single compressor has required shutdown for cleaning. One compressor was run as a trial with no treatment for a short period and within six weeks the compressor required a shut down for de-scaling.

Columbian Chemical Installation

Summary:

Reasons to choose Fluid Dynamics hard water treatment products

- Fast return on investment
- Reduces/Eliminates need for chemicals
- Reduces Health & Safety risks
- Simple to install
- Can operate continually for many years
- Increase compressor efficiency
- Help maintain compressor lifespan
- Reduces environmental impact due to chemical reduction
- Reduces/Eliminates downtime for compressor cleaning
- No maintenance or running costs are required for treatment