



## R.O Plant Treatment From Fluid Dynamics

**PREVENTING MEMBRANE  
SCALING, REDUCING WASTED  
WATER AND PREVENTING  
CHEMICAL USE**



**Non-Chemical Scale Prevention:  
A More Effective Way of Treating Water**





# Fluid Dynamics

Hard water solutions since 1973

## Who we are

Fluid Dynamics, headquartered in England has been in business since 1973. Fluid Dynamics is the world's oldest catalytic water treatment company with hundreds of thousands of units installed world wide.

With an unmatched pedigree in the field of hard water scale prevention, Fluid Dynamics has built an impressive archive of case studies that are available at our web site.

[www.fluidynamicsna.com](http://www.fluidynamicsna.com)

## Our Mission Statement

Our mission is to provide proven, cost effective **Green** technologies and responsible environmental stewardship while setting the highest standard for customer service to meet our customer's needs.

To provide our customers with the opportunity to benefit from reduced costs and increased profits while improving their environmental footprint.

## Our client list includes:

Travel Centers of America

YMCA

Bush Beans

Hobart

Briggs Industries

Cambridge University

Coca Cola

Ford

Giant Foods

Guinness

Honda

Perdue Chicken

Kellogg's

Kimberly Clark

Marks & Spencer's

McArthur Dairy

Nestle

NHK

Pfizer

Renault

Unilever

Walmart

Westfalia

US Army

US Navy

and many more





## Scaling in R.O. Plants

R.O membranes are used to remove mineral salts from sea water or fresh water to convert it to pure water. The mineral salts deposit as scale inside the membranes causing them to become plugged.

This poses a number of problems for RO system operators including:

- A reduction in the volume of pure water delivered.
- The cost of removing the deposition using traditional water treatment methods such as water softeners or chemical inhibitors to reduce the rate of deposition.



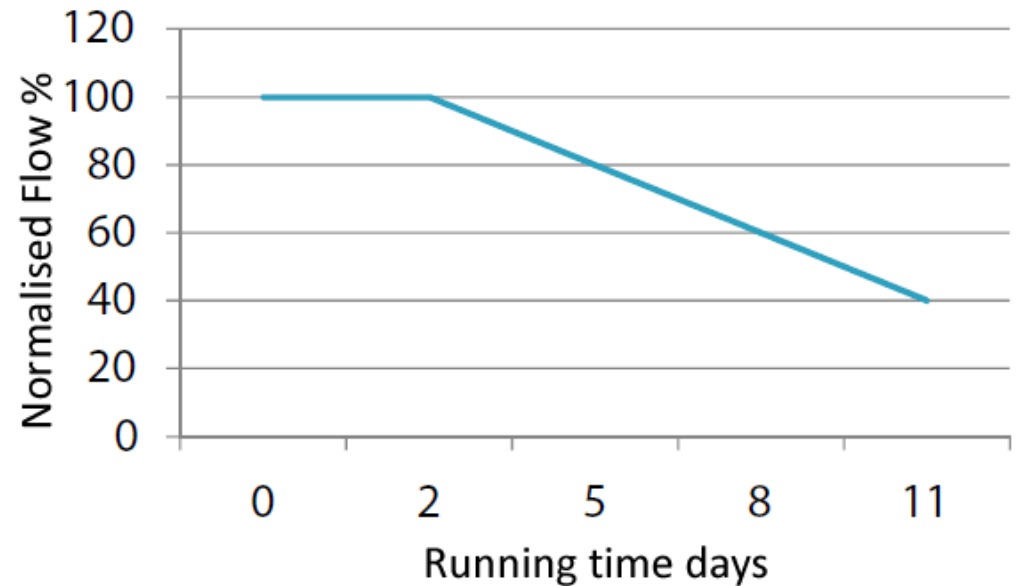


## Compromised Pure Water Delivery

Due to the high level of mineral salts found in water treated by R.O systems deposition occurs as the water becomes super saturated with minerals. These minerals deposit on the membrane surface resulting in permeate flux decline reducing the efficiency of the process and increasing operation costs.

The effects of scale on the permeation rate of RO systems is illustrated in the following figure. Following an induction period, plant flow decreases rapidly.

### Scaling vs RO Performance





## How does it affect the operation?

Preventing or removing scale deposition will cause a number of problems. The first is the additional cost a customer must spend on treating the problem as well as the reduction in lifespan of the membranes, many companies will spend a large sum on chemical treatment, reducing the amount of scale forming and the removal of deposited scale.

This will also bring additional health and safety risks as employers must abide by stringent chemical handling procedures to avoid potentially fatal incidents.





## Cost of Scale to R.O. Plants

The cost of preventing scale formation on membranes is split into two areas:

### Water Softening

Average cost of softening system		
Amount of water hardness (Mg/l)	Equipment Cost	Annual Salt Cost 5 year period
10	US\$20,000	US\$10,000
20	US\$20,000	US\$20,000
50	US\$40,000	US\$50,000
100	US\$40,000	US\$125,000
250	US\$40,000	US\$250,000

### Chemical Treatment

Average cost of chemical anti-scalant system		
Amount of water hardness (Mg/l)	Equipment Cost	Chemical Cost 5 year period
10	US\$2,000	US\$7,500
20	US\$2,000	US\$7,500
50	US\$2,000	US\$7,500
100	US\$2,000	US\$8,750
250	US\$2,000	US\$10,000

Figures based on output flow of 75 GPM (17 m<sup>3</sup>/hr)

Additional costs include the decreased lifespan of membranes from scale build up and production losses due to the decrease in pure water delivery





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## The Fluid Dynamics Solution

For over 40 years Fluid Dynamics has manufactured and supplied its simple to use non-chemical catalytic water treatment equipment. Our technology has a growing reputation in providing chemical replacement systems helping to create a more environmentally friendly water treatment system.

Scientifically backed up as a valid method of treatment for preventing scale accumulation, our catalytic technology has been employed in many single pass and re-circulating water systems, large and small, giving a fast return on investment.



2" diameter unit



16" diameter unit

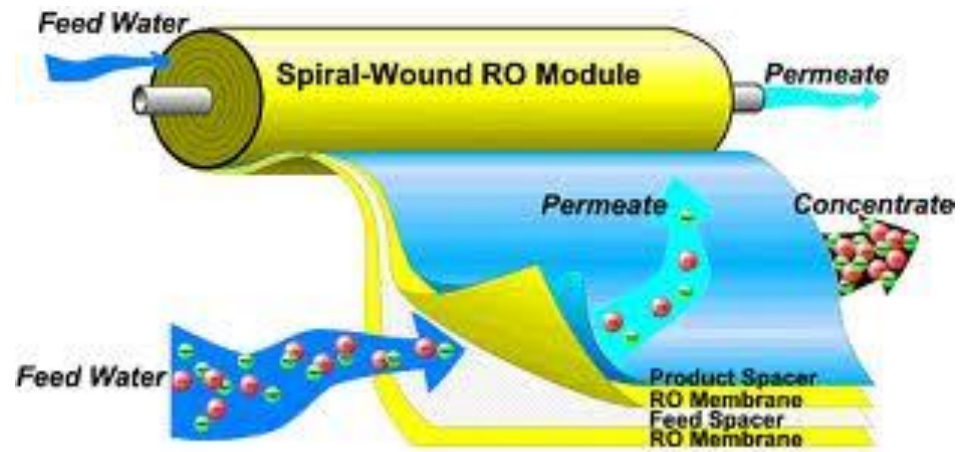




## The Fluid Dynamics Solution

One of the problems affecting RO membranes is calcification. This occurs when calcium builds up as a hard crust on the inside of the membrane. Pressure changes in the membrane cause this and the standard way of dealing with this problem is to backwash the membrane with an acidic solution. On a domestic membrane this is not practical so as the membrane becomes clogged it produces less and less water and is then thrown away.

The Fluid Dynamics catalytic unit will precipitate some of the calcium so it will form a much softer deposit and the flow of the water through the membrane will wash some of it off. We cannot stop it forming completely and of course it is not just calcium that blocks the membrane but everything that it takes out can get clogged in the pores. But calcium is the tougher problem because it forms hard scale.



The Fluid Dynamics unit serves to extend the life of the membrane by up to 25%. This is due to the fact that the calcium does not form such a hard crust and it takes longer to block the pores. As a result more water passes through the membrane because of the lower clogging levels.







## Benefits of Fluid Dynamics Catalytic Treatment

- Fast return on investment
- Reduces/Eliminates need for chemicals
- Reduces health & Safety risks
- Simple to install
- Can operate continually for many years
- Increase overall R.O System efficiency
- Prevent system pressure losses
- Maintain membrane lifespan
- Reduces environmental impact due to chemical reduction
- Reduces/Eliminate downtime for membrane cleaning
- No maintenance or running costs are required for catalytic treatment





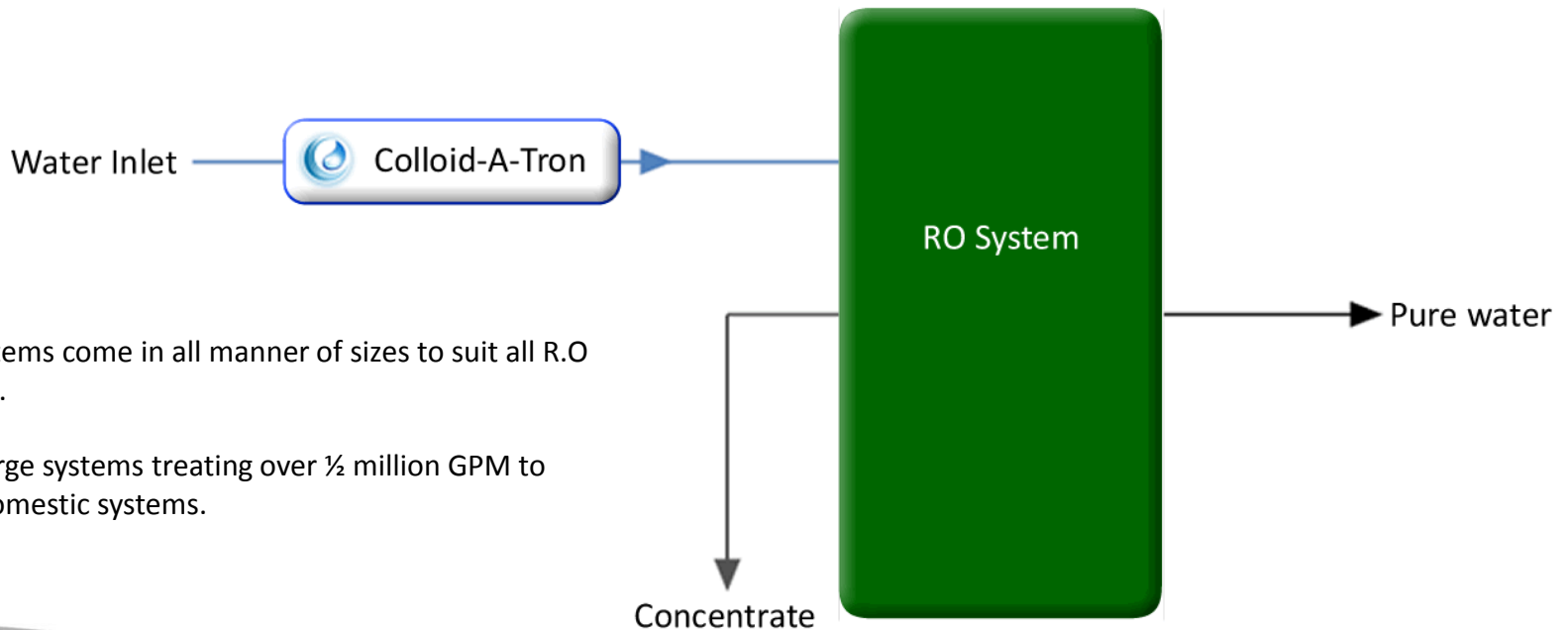
## Typical Installation Example

The Fluid Dynamics Colloid-A-Tron unit is shown installed on the water supply line to the RO unit.

The Colloid-A-Tron can be installed in either a horizontal or vertical position.

The equipment is sized based on the flow rate of the water supply and is installed after the feed water pump.

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



Our systems come in all manner of sizes to suit all R.O systems.

From large systems treating over ½ million GPM to small domestic systems.





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## Case Study:

Mitsui specialty chemicals need pure water for their manufacturing process and have a reverse osmosis system capable of treating 500m<sup>3</sup> of feed water per day.

The company were concerned about the level of chemicals used on a daily basis. They were interested in reducing chemical usage, reducing energy costs and increasing their pure water yield.

In November 2010 a Colloid-A-Tron non chemical scale prevention system was installed on the inlet to the membranes after the feed pump.



**Mitsui Chemicals**





## Installation Example

Mitsui Specialty Chemicals need pure water for their manufacturing process and have a reverse osmosis system capable of treating 500m<sup>3</sup> a day of feed water.

The company were concerned about the level of chemicals that they were using on a daily basis and also interested in the possibility of reducing energy costs and in increasing pure water yield.

In November 2010 they installed a Colloid-A-Tron non chemical scale prevention system on the inlet to the membranes and after the feed pump.



### **The Results:**

#### **Energy Saving:**

As the membranes did not scale up so much so the amount of energy used by the pump reduced by almost 10%

#### **Increased yield**

In addition the membranes became more efficient moving from an RO brine ratio of 50:50 to one of 55:45

#### **Reduced Chemical usage**

Anti scaling chemical usage dropped by 35% after installation of the Colloid-A-Tron

Biocide chemical addition has been reduced by 80% after the installation of the Colloid-A-Tron

**Payback** is estimated by Mitsui as being achieved in seven months The reduced environmental impact by the dramatic reduction in chemical usage is priceless.

