

CASE STUDY

Medium-sized hotel based in Swindon, England

Overview

The property is a 156 bedroom hotel located in an area with particularly hard water. It has historically experienced significant hard water problems throughout the hot and cold systems and other critical water related equipment. A trial of the Integro™ water restructuring technology was agreed and ran from April to October 2021. The trial was overseen by the regional Director of Engineering, with day-to-day management and reporting carried out by the hotel's maintenance managers.

Following successful completion of the trial, the hotel chose to keep using the technology (instead of water softeners) as their solution for the hard water problems throughout the entire site.

Key Problems

Problems identified at the point of the initial inspection were:

- ⦿ The master boiler was not working due to being scaled up to the point that water could no longer flow
- ⦿ Showerheads, taps and other water fittings were regularly becoming blocked with scale
- ⦿ Without proper flushing, the build-up of limescale and the resulting biofilm could lead to higher levels of waterborne bacteria, including Legionella. Control of this was understandably a high priority
- ⦿ The washing machine in the small laundry facility was regularly breaking down because of scale build-up
- ⦿ The dishwashers, ice machines and other kitchen equipment were breaking down and/or having to be descaled regularly
- ⦿ The heat exchangers/calorifiers were badly scaled up
- ⦿ There was significant evidence of limescale on fixtures and fittings throughout the plant room, in particular where there were leaks

Water Analysis

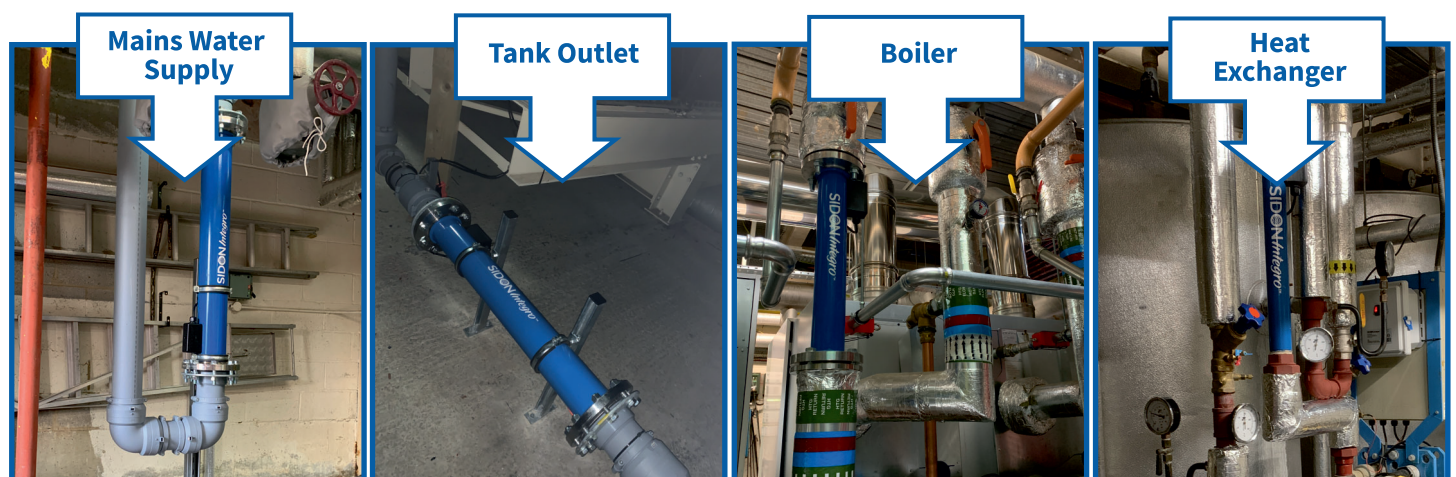
A water analysis report carried out in December 2020 confirmed that the mains water supply was very hard (301.3 mg/l hardness as CaCO₃).

Detailed Results

Determinand	Value	Units	Determinand	Value	Units
pH	7.5		Conductivity	571	uS/cm
Nitrate-N	8.8	mg/l	Ammonia-N	< 0.1	mg/l
Chloride	16.3	mg/l	Sulphate as SO ₄	18.3	mg/l
Phosphorus as P	0.2	mg/l	Boron	0.03	mg/l
Potassium	0.9	mg/l	Copper	0.29	mg/l
Magnesium	1.70	mg/l	Manganese	< 0.01	mg/l
Calcium	117.8	mg/l	Zinc	0.25	mg/l
Sodium	6.9	mg/l	Iron	< 0.01	mg/l
Carbonate	< 10	mg/l	Alkalinity as HCO ₃	303	mg/l
Hardness as CaCO ₃	301.3	mg/l	Dissolved Silicon	8.8	mg/l

Our Solution

Following a site survey it was decided we would install four Integro™ units to points in the hot and cold water systems in the hotel in order to remove the existing scale build-up and prevent any more in the future. Two units were installed on the cold water supply, taking care of the entire building. An additional two units were installed directly before the boilers and heat exchangers.



The Results

The Integro™ technology immediately began to remove historical limescale build-up, dissolving it back into solution as fresh water passed through the system. By taking samples where the water enters the building (before restructuring), and then at subsequent points further down the line (after restructuring), we were able to show that the technology was working. The level of hardness increased at each sample point as the Integro™ units dissolved the old scale build-up back into solution. This water analysis was carried out regularly until these readings levelled out, indicating that the system was now clear. This took approx. 45-60 days.

At the end of the trial period, both water analysis and observational findings have proven conclusively that the Integro™ technology has been working effectively. Existing limescale has been broken down in the system, with no new limescale forming in the areas being observed throughout the trial period.

In terms of observational findings in the areas of concern:

- Legionella – no hits during the trial period, despite this being at a time when the hotel had been forced to close and then reopen due to Covid restrictions
- Boilers and Heat Exchangers – no reported breakdowns since the Integro™ installation. The temperature is higher and the pressure has improved, indicating scale is being removed
- Showerheads and Taps – cleaning has been noted as being easier as existing scale is cleared
- Ice Machines – existing scale crumbling away and no new build-up
- Laundry – no reported breakdowns during Integro™ trial period
- A representative of Thames Water who was visiting the hotel to carry out a leak reduction survey of the water system spoke very positively of the effects of the Integro™ in removing old limescale build-up
- Dishwashers – no reported breakdowns since the Integro™ installation, scale can simply be wiped off as hard scale is not being formed

*The three photos below show the scale build-up from prior to the installation **literally being wiped off with a finger in the dishwasher.** This is clear example of how the limescale no longer binds to form hard scale build-up.*



Return on Investment

The Carbon Trust estimates that just 1mm of limescale in heating equipment increases energy consumption by up to 7%, with 6mm increasing consumption by as much as 40%. It is not at all uncommon for boilers and heat exchangers in hard water areas to have at least this amount of build up, leading to significantly increased utility bills.

The ROI/Capital Payback for this trial was based upon three key areas of concern for the hotel (energy consumption, equipment repairs and Legionella control), and calculated based upon figures supplied by them. Considering these costs, and with the option of either purchasing the equipment or taking it on a monthly service contract, the Capital Payback and ongoing ROI models for this site would be:

Capital Purchase

Payback Month 13 onwards, saving approx.
£44,000 per annum ongoing

Monthly Service Plan

Payback Month 7 onwards, saving approx.
£30,000 per annum ongoing

Environmental Benefits

As well as significant cost savings and the other benefits detailed above (improved Legionella control, equipment easier to clean, etc), this hotel will achieve the following environmental benefits:

- Extended life of water related equipment such as pumps, boilers, heat exchangers and improved efficiency of heating and cooling equipment
- Reduced failures in equipment due to scale and corrosion, meaning decreased engineer visits and reduction in the demand for spare parts, both of which carry direct and indirect (manufacturing and supply chain) increases to the hotel's carbon footprint
- Improved water efficiency
- Reduced detergent and chemical use

Summary

This trial was deemed to be extremely successful by all involved and demonstrated conclusively that the Integro™ system works to remove existing limescale and prevent future formation throughout the hot & cold water systems, critical equipment and appliances. As well as offering a significant return on investment, the hotel is experiencing additional benefits such as improved guest experience and having a more positive impact on the environment.

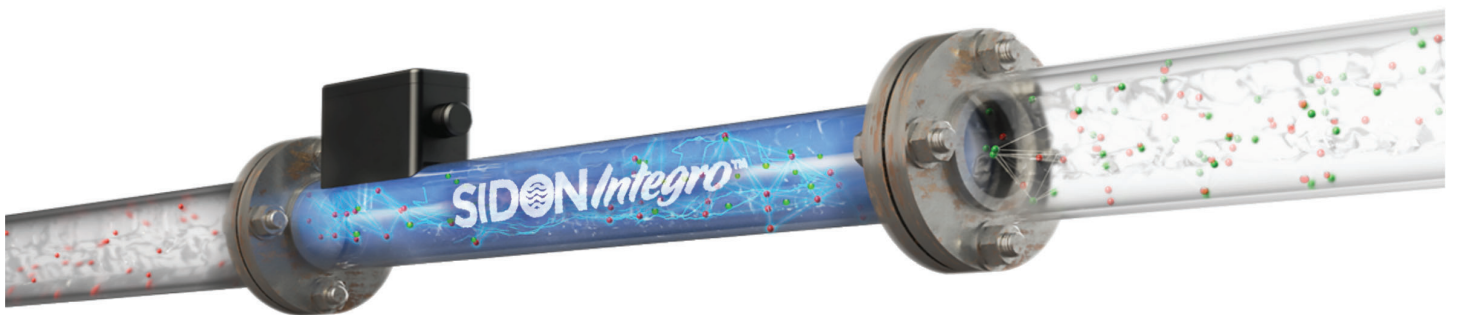
What the Hotel had to say

“We installed the Integro system in April 2021, a very quick install with no disruption to the hotel operation.

Within a month we noticed the reduction in scale in the Rack Dishwasher and Ice Machines. The quarterly cleaning of the showerheads and taps as part of the Legionella prevention programme has been noticeably easier. We have seen an improvement in hot water temperature and pressure indicating the removal of scale build up in the boilers and heat exchangers.

Sidon Water have been easy to work with every step of the way resulting in an extremely successful project”

Cluster Director of Engineering, South, West and Wales



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UL 61010-1
CSA - C22.2
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