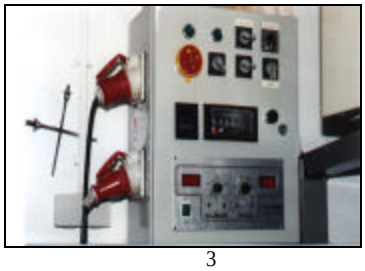
Report of experiments on the prevention and removal of scale using "**Scale***watcher*™"

The company

In hard water areas, bakeries experience scale problems on the heating elements of steam producing equipment. Mr. Lindeboom at the "Jan de Bakker" patisserie in Urk, The Netherlands, (picture 1) discovered that scale build-up in the equipment resulted in high maintenance costs and increasing energy bills.


1


2

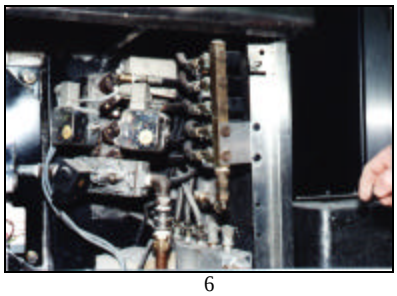

3

The process

Before the dough is baked in an oven it has to go through three stages where the dough rising process is accelerated by use of special units. Quantities of dough are first measured and aerated by a special bakery cone (seen in the foreground of picture 2). An automated system conveys the dough to the first rising process unit. The temperature and the humidity of the rising unit is regulated by steam which is controlled by a climate system. The operating unit is portrayed on picture 3. Once risen, the dough is placed on either baking trays or tins. These are stacked on a trolley and wheeled to the next rising units. The humidity and the temperature of this rising unit differ from those in the first rising unit and they are independently regulated. The third and last rising unit is also called the after-rising unit. This unit is the same type of unit as the one on picture 4. The temperature and the humidity of this last rising unit are also independently regulated.


4


5


6

After the stages of rising the rolls and loaves are baked in the oven. Steam is here also necessary. This humidity is realised by carrying water through the oven by a sprinkler installation. The water is led from above the oven to below by small channels. All channels together form a moistening element against the hind wall of the oven. On picture 5 this element is portrayed. The water that will evaporate from the channels cannot get away from the oven, by which the humidity in the oven will increase.

The water discharge can be found behind the aluminium cover plate on the left side of the moistening element. This is regulated in a way that the upper channels are supplied with more water than the lower

channels. In this way the quantity of water is constant because a part of the water (the rest evaporates) will pass to the lower channels from the upper channels.

A rotating plateau has been placed in the oven so that all the dough can be moistened on all sides.

The problem

The solubility of scale in water strongly depends on the temperature of the water. The warmer the water, the more scale will deposit. This is in contrast with sugar, for example. Because steam is used for the required humidity, the temperature of the water will rise. The possibility arises that the saturation point of scale in the water will be exceeded. At this point, the scale will begin to deposit from the water solution as a precipitate on the pipe walls, or sprinkler nozzles, etc. This manifests itself in the choking up of sprinkler openings and the scale deposits on heating elements. This causes several problems.

- The water will be distributed irregularly through the narrowed openings.
- The efficiency of the heating elements decreases, because the heat must first travel through the scale coating. Because of the above reason, the heating element may fail prematurely because it cannot get rid of its heat quickly.

Mr. Lindeboom experienced these problems himself, especially with the rising units. On an average of once a year the heating element had to be replaced and the distribution of steam was not optimal. At the third rising unit, in contrast with the first two rising units, the steam is distributed in a complex way. This machine, portrayed in picture 6, is very sensitive to scale. A great deal of scale was found in this unit alone. In addition the quality of the steam decreased. The electricity bill was too high because of the scale according to Mr. Lindeboom.

The solution

To combat the problems with scale Mr. Lindeboom bought a commercial **Scale*watcher*** ™ unit. Before attaching the unit to the 22 mm/1'' main inlet, analyses were done at two sites. The data that were revealed are registered in the following table.

	At the main inlet	In the steam unit	Dimension
pH	7.4	8.4	-
Conductivity	6.7	45.0	µS/cm
Hardness	150	>300	mG/l
Alkalinity P	-	1.1	mmol/l
M	4.0	2.3	mmol/l

The main inlet to which the **Scale*watcher***™ was attached in June 1996 is also the supply for the house of the Lindeboom family. By placing the **Scale*watcher*** at this spot, all of the water entering the bakery and the house is treated in one pass.

Conclusion

By installing the **Scale*watcher*** the deposits of scale in the rising units as well in the oven has disappeared. The present scale has broken off. This resulted in a significantly lower electricity bill than expected**.**
Because there is no scale anymore in the Climate equipment, the distribution of steam has become more regular. In this way the quality of the final product was improved.

Since the installation of the Commercial **Scale*watcher***™ unit the heating elements remain free from scaleand the lifespan, as one can expect has been increased.

Mr. Lindeboom is very satisfied with the results of **Scale*watcher***™. He very strongly recommends **Scale*watcher***™ to other bakeries. Also Mrs. Lindeboom notices the difference since **Scale*watcher*** has been attached to their main. The dishes that nowadays come out of the dishwasher are bright and shiny again.

Source: Scalewatcher NL BV, Alphen a/d Rijn, The Netherlands

Scalewatcher North America Inc, Oxford Pa 193632, email swna@scalewatcher.com
For Europe: Scalewatcher NL BV, The Netherlands, email: swnl@scalewatcher.com
For South East Asia: Scalewatcher Vietnam LTD, Hanoi, email swvn@scalewatcher.com