

Case Study

To evaluate the effectiveness of Continu Water Line Disinfectant on a Hot Towel Dispenser

Work carried out by Mike Loftus on behalf Emma Harrison, Gemstar Services Limited

INTRODUCTION

A number of customers have approached Gemstar to provide an anti bacterial towel from their Hot Towel Dispensers.

Gemstar were keen to develop a solution that achieved the following objectives:

- No emission of harmful biocides
- No unpleasant odours
- Effective at high temperatures
- Capable of disinfecting the bottled water and pipes within the hot towel dispenser

Maintaining good levels of hygiene within water lines is a problem which has frequently been the subject of scientific enquiry. For instance a report in the Journal of Applied Microbiology states:

"Many studies over the last 40 years demonstrated that output water is often contaminated with high densities of micro-organisms, predominantly Gram-negative aerobic heterotropic environmental bacteria, including *Legionella* and *Pseudomonas* species. Untreated water lines host biofilms that permit micro-organisms to multiply and disperse through the water network, thus exposing staff to these micro-organisms, to fragments of biofilm and bacterial endotoxins".¹

As the Hot Towel Dispenser uses a water bottle there is a potential risk of microbial presence building up in the supply source and in the pipes within the machine. As micro-organisms are also a source of odours, there is also the possibility of smells emanating from the machine if it is not regularly cleaned and disinfected to remove biofilm.

Ultracide Solutions Ltd is an existing developer and manufacturer of high quality water-based disinfection and, following a period of laboratory development, released a Water Line Treatment which carried the following claims:

- Highly effective elimination of biofilm from the whole water line including the supply bottle;
- Long term reduction in bacterial contamination;
- Harmless to the water lines;
- Safe

The Water Line Treatment is available through Nuview Ltd, sole distributors of the Ultracide dental disinfection range.

TEST METHODOLOGY

Test Method

The study applied the Adenosine tri-phosphate (ATP) bioluminescence method for monitoring levels of contamination which is widely used particularly in clinical research and food production.^{2,3}

The ATP methodology has many advantages over methods relying on measuring colony forming units (CFU's). The system provides rapid results indicating both the presence and level of microbial and organic contamination on surfaces and therefore presence of potentially harmful pathogens.

ATP systems record levels of light energy generated by the release of adenosine tri-phosphate from the organism, a chemical present in all organic matter. A swab is used to gather a specified sample of surface material and an enzyme is applied to the swab to release the ATP thereby generating light energy. The light energy released (measured by an extremely sensitive light meter) provides an accurate correlation to CFU's and is therefore a comparable indicator of the presence of microbes on the test surface. The energy is measured in Relative Light Units (RLU's).

Test Protocol and Data Acquisition

Gemstar were provided with a supply of Water Line Disinfectant to use in one of their Hot Towel Dispensers, in accordance with the manufacturer's instructions, running it in the machine over a 2 week period. A control machine was also run during the same period without using a disinfectant in the water bottle.

The treatment was first applied on Monday 21st March 2011 and data was collected on Tuesday 5th April 2011 using swabs to measure the levels of microbes present in each test area.

TEST RESULTS

Adenosine tri-phosphate (ATP) bioluminescence was used to monitor levels of contamination in the selected areas (see test method above). In order to interpret acceptability of levels of bioluminescence, control parameters which are appropriate to the environment being tested need to be established. In this case study, the bioluminescence ranges listed below (Table 1) were taken as a guide to acceptable levels of RLU observed.

BIO-LUMINESCENCE RANGES TABLE 1

RLU COUNT	INTERPRETATION
0-50	Acceptable in intensive or deep cleaning procedures
51-100	Acceptable in standard non-critical surfaces
100+	Fail

The results from the readings in each machine are shown in Table 2 below:

TEST RESULTS TABLE 2

Test Area	Treated Machine	Control Machine
Dispensed Towel	2	2
Water Bottle	18	244
Water Outlet	1	663

CONCLUSIONS

- The level of micro-organisms within the dispensed towel is at a level that would be acceptable in a deep cleaning environment whether the water line is treated or not so there is minimal risk of cross contamination from the towels themselves
- The reading in the control water bottle was at a fail level whereas the treated bottle was well within acceptable guidelines for a deep cleaning environment suggesting that the disinfection solution performs effectively at higher temperatures and the water bottle benefits from treatment. This conclusion applies equally to the water outlet

RECOMMENDATIONS

- The high reading from the water outlet in the untreated machine raises concern that microbial presence may lead to unpleasant odours if the unit is not disinfected and, in due course any toxins present in the biofilm may be expelled onto the towels, although this was not evident during the trial period, so a regular disinfection regime is recommended
- Case studies have demonstrated the effectiveness of Continu Water Line Disinfectant in reducing microbial presence and this should be applied to the Hot Towel Dispenser to reduce the risk of cross contamination.

We would like to extend our thanks for the opportunity to carry out this work and for the help and cooperation received.

Mike Loftus

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- 2) M Easter, *Hygiene monitoring in support of food safety – methods and trends*, Hygiene Monitoring, FS&T Volume 21, Issue 4, December 2007
- 3) Department of Health, *Evaluation of ATP bioluminescence swabbing as a monitoring and training tool for effective hospital cleaning*, DofH R&D Report issued 2007