

## FEATURE FOR FOOD PROCESSING

### CLEANING UP WITH OZONE

**How do you ensure that every area of your food processing plant – the drains, air conditioning vents and hard to access parts of machinery – are completely free from potentially hazardous bacteria viruses, yeasts moulds and spores. Trials of ozone as a biocide currently being carried out by Hygiene, a specialist cleaning services provider to the food and pharmaceutical industries, are indicating a significant breakthrough.**

Ozone was first discovered in 1840 and began being used as a disinfection agent in the production of potable water in France in the 1900s. It is effective in killing micro organisms through oxidation of their cell membranes and most of the pathogenic food-borne microbes are susceptible to its oxidising effect. Ozone is known to be up to 1000 times stronger than chlorine and effective over a much wider range of micro organisms.



STERITROX™ S600, a machine developed by Steritrox Ltd,

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So far, so good. However, although using ozone gas as a biocide is becoming much more commonplace, mis-handling of the gas and a lack of understanding of its capabilities has led to many problems. Ozone (O<sub>3</sub>) is an activated trivalent (3 atoms) form of oxygen, it is unstable and breaks down into two atoms of regular oxygen – the half-life for this reaction is approx. 20 minutes. This rapid process of natural degradation is both an asset and a liability. On the plus side, it means that the ozone disappears literally without a trace – leaving no chemical by-products. On the minus side, it means that ozone has a very short effective life. Equally, working with ozone has inherent hazards. Breathing high levels of ozone can trigger a number of health problems, ranging from chest pain and coughing through to reduction of lung function.

The key to the successful application of ozone as a biocide in food processing plants currently seems to lie in the STERITROX™ S600, a machine developed by Steritrox Ltd, distributed by Ozone Systems Ltd and currently being put through its paces at a high risk food manufacturer in the north of England that makes ready meals for the pub trade, by Hygiene.

Simon Brunker Technical Manager Hygiene believes that significant strides have been made with the development of the STERITROX™ S600 and that it is putting both Hygiene and Steritrox Ltd at the cutting edge of development. He says: “STERITROX™ is overcoming the problems that have been associated with the traditional wall-mounted ozone gas machines. The main issues with these have been lack of effective control and substantial downtime involved in the cleaning process. Biocidal activity is very variable and in the past there has been a high guesstimate factor in the use of ozone. With the time required for the cleaning process itself, plus the need to allow perhaps 2 to 3 hours for the ozone to dissipate, it has not been a practical option for cleaning active production areas; instead it has tended to be used for increasing shelf life in refrigerated storage areas.”

One key advantage of the S600 relates to its ability to adjust to ozone debt. Organic volatile compounds in the air will “use up” ozone, the level of this absorption representing ozone debt. Only when this debt has been paid and the organic compounds have taken their share of the output can the ozone begin its clean up act.

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The more highly flavoured or aromatic the substance concerned, the higher the ozone debt. So, a facility producing curry sauces will have a significantly higher ozone debt than one processing salads.

Where STERITROX™ differs from previous types of ozone gas sanitising is that it balances its output according to the needs of the specific environment. Simon Brunker: “Previously, the ozone engineer would work on the basis of particular environments needing fixed amounts of ozone and the machine continues pumping out ozone until that fixed amount is reached. The STERITROX™ S600 is designed to maintain desired levels, compensating for specific ozone debt, and adjusting itself accordingly, rather like a thermostat will operate to balance temperature.”

Another built-in element of the system is a humidity adjustment. Simon Brunker: “In their development process, STERITROX™ Ltd found that ozone gas is far more effective under humid conditions. In food processing plants, humidity levels often vary dramatically, so S600 is designed to adjust the humidity of the atmosphere during the cleaning process to increase the effectiveness of ozone as a biocide.”

Once the ozone has done its job there is, of course, the question of removing or “quenching” the ozone rather than waiting for levels to reduce naturally. This has been solved by the use of a biocidal quenching agent which reacts to literally mop up the remaining ozone, and in the process creates more free radicals that contribute to the biocidal effect. The addition of the quenching system has also enabled STERITROX™ Ltd to build in a safety cut out. Although the machines generate levels of ozone gas up to a concentration of 10 parts per million in the working environment, the STERITROX™ operates unmanned. A built in Doppler sensor detects any motion in the working area (such as a door opening) and the quenching operation immediately kicks in, thus eliminating the accidental exposure of staff to Ozone.

In the trials at a high risk food manufacturer in the north of England that makes ready meals for the pub trade, which produces a wide variety of ready meals for the pub trade, Hygiene have been using the STERITROX™ in one of the busiest parts of the factory. The trials take place overnight after the routine cleaning.

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Using the STERITROX™, Hygiene carries out a high level cleaning process that literally pumps ozone into the atmosphere. In gas form, it is capable of penetrating areas of plant and equipment that normal sanitising would not reach. Over a period of time, the use of ozone will also help to break down any residues in, say, gratings or ventilation fans helping other forms of deep cleaning to be more efficient.

From Hygiene's point of view the trials are proving extremely interesting. Simon Brunner: "As experts in the cleaning industry, we are constantly looking at new ways of solving old problems. Our 'real life' experience, allied to STERITROX™'s developmental expertise, is leading us to a solution that really is at the cutting edge. At the moment, we are probably using the S600 at the extreme of its limits in terms of the size and amount of equipment in the processing area. We have been impressed by its capabilities and, more importantly, we have been able to feed back to its manufacturers a number of operational factors that could affect performance.

"Overall, we are seeing a number of benefits. It is a simple system to operate and certainly eliminates the downtime formerly associated with ozone gas sanitising

**ends**

*Approx 1100 words*

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