

# HIGHLIGHTS

FROM THE MICROWAVE TECHNOLOGIES ASSOCIATION

[www.microwaveassociation.org.uk](http://www.microwaveassociation.org.uk)

## From our Chairman:



### Recognition at last!

As visitors to the MTA's website will have seen in the 'Stop Press' section - the British Standards Institution (BSI) has appointed our MTA Technical Officer - Gordon Andrews to be their Microwave Expert. Gordon will now represent Great Britain at IEC international microwave TC 59/SC - 59K/MT1 Committee Meeting activities. Readers will be delighted that Gordon has accepted this auspicious position and that at last, the microwave industry in the UK and Europe will be represented by having a common sense, knowledgeable voice on this committee.

Sharp also has a new Brand Communications Manager - who has recently been able to put some 'microwave cooking tips' in to the 'Daily Star's on-line news paper. You can find these links also in the Stop Press' section of the MTA's website.'

We also have masses of interest in the technical features published in the last two issues of HIGHLIGHTS - the last is printed opposite. These articles 'highlight' the expertise held within the MTA - and the very valuable information we can provide to members, not to mention useful meetings held 3 times a year. The last one was held at the offices of Tesco - where we were all enlightened as to the workings at the head office of the most successful supermarket in the UK.

All this valuable information has been available to members. Yet, to date this year, we have received four resignations from our membership. As a voluntary association, a paying membership is essential - so if you can pass a copy of this newsletter to a colleague in the microwave industry - hopefully we can increase our membership again - in order to at least stand still!

We are now on a 'membership drive'! Any help would be gratefully appreciated. Look out for details of our Autumn meeting, to be held in November, meanwhile please enjoy our English summer - it's 14 degrees today. '

**JENNIPHER MARSHALL -JENKINSON**

## FOLLOWING OUR LAST ARTICLE ON THE MICROWAVE HEATING CATEGORY WE NOW GO ON TO EXPLAIN WHY THE FOOD INDUSTRY IS SO INTERESTED IN HEATING READY MEALS TO 70°C

*Nigel McCulloch-a Senior Technologist in the Bakkavör Group*

Why is the food industry so interested in heating ready meals to 70°C? You may think that this temperature was chosen simply because it's 'nice and hot', making the food pleasant to eat (and that's certainly true), but there is a scientific reason for choosing 70°C and also for asking the consumer to wait for one or two minutes after heating before eating their meal.

The food industry in the UK has an excellent reputation for quality and safety. This is built upon high customer expectations, strong legislation and criminal law. We apply scientific principles to the work that we do, to ensure our products are safe for the customer at point of sale and we also give instructions which explain how best to store and prepare the meal before consumption. So why do we target 70°C and why do we sometimes ask the consumer to wait after heating before eating? Over the years scientists have worked to understand how heat kills micro-organisms. It is well known that certain organisms are more heat resistant than others and in the ready-meal industry the most heat resistant organism we would seek to prevent, inhibit and destroy is *Listeria*. This is known as the target organism.

Scientists have modelled the response of *Listeria* to heat and used 70°C as a starting point. By holding the bacteria at this temperature for a given time then measuring the size of the surviving population they were able to calculate what is known as the Decimal Reduction Time (the 'D Value'). The D value is the length of time it takes at a given temperature to reduce the bacterial population by 90%, so for instance 100 bacteria would be reduced to 10 (this is known as a 1-log reduction). For *Listeria* the D value at 70°C is 0.27 of a minute. This is rounded off to say that a 3 log reduction is achieved every minute (1000 *Listeria* would be reduced to just 1 survivor). In truth a slightly greater reduction is achieved, but it is rounded down for safety and simplicity.

The food industry targets a 6 log reduction of *Listeria*. This isn't because we expect to see large *Listeria* populations in meals but because we make a large number of packs. With a 6 log reduction (2 minutes at 70°C) you would expect 1,000,000 *Listeria* organisms to be reduced to just 1 survivor. Obviously 1 million *Listeria* would never be permitted, but if you had a starting population of 1 in your meal you wouldn't get 0.000001 survivors after a 6 log reduction, you would instead expect 1 surviving organism in every 1,000,000 packs. The food industry targets this time and temperature because of the millions of packs we make and because if *Listeria* was present it would effectively reduce the risk of illness in consumers.

Are any other times and temperatures affective? This is slightly more complicated. We also understand how the D value changes as we increase or decrease the temperature. If you plot these changes on a graph and then calculate the slope of the resulting curve you can work out how much you would have to increase or decrease the temperature by to kill the bacteria 10 x faster or slower. This is known as the Z value. The Z value for *Listeria* when starting at 70°C is 7.5°C, so each time you increase or decrease the temperature by 7.5°C from your starting point of 70°C you kill the bacteria 10 x faster or 10 x slower. Thus a 6 log reduction using 70°C for 2 minutes is the same as 77.5°C for 0.2 minutes (or 12 seconds) and is also the same as 62.5°C for 20 minutes.

These examples highlight how a relatively small change of final temperature can dramatically change the kill achieved from a re-heat. If the instructions target 70°C at the end of microwave heating with a 2 minute hold but the performance of the oven means that only 62.5°C is reached the bacterial reduction will not be 6 logs, but 0.6 logs. In the unlikely event of the meal carrying a population of *Listeria* or other food pathogen this could potentially leave the consumer at risk.

In the food industry we use calibrated thermal and microwave ovens to develop our reheat instructions and take every care to ensure they work well at 750W and 850W but we rely on consumers to follow those instructions and expect that their ovens work well.

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Continued .....by Gordon Andrews, Technical Officer MTA

*In the article overleaf by Nigel McCulloch, and the article in our last issue by Greg Hooper, we have been covering the performance of the microwave oven and its effects on food heating. In this, probably final part of the jig-saw, I would like to remind you of the importance of the oven's operating conditions.*

You have seen from the article by Greg Hooper how oven performance can vary from oven to oven, often at the same quoted power output and from the same oven brand, and from Nigel McCulloch the importance this effect has on food microbiological safety. All of this is of major importance, but to a certain degree dependent on the oven's operating conditions. Clearly the electrical supply is important, but usually outside of the oven operator's control. The UK electrical supply was harmonized (during 1996) with the rest of Europe @ 230 volts -6% + 10% (216 to 253 volts) and yet it is possible to find many local variations affecting oven output power performance. Ovens can be rated at 230 or 230/240 volts with some brands declaring power output at both 230 volts (e.g.750 Watts) and 240 volts (e.g.800 Watts) making the UK Rating Scheme-as Greg explained -of even more importance. .For instance,. I am often involved in calibrating ovens in other EU countries to ensure their food products meet UK food industry (BRC) approval and the retailer requirements!

The solution (and many food companies already have these devices in place) is to control the supply voltage locally using voltage regulators. These regulators can automatically adjust the supply voltage to the oven for it to operate within nominated tolerances, since the voltage varies during use and throughout the working day, which can vary considerably during the hot and cold seasons, and within heavily populated local industry activities.

The other significant variable is the oven itself. The manufacturer can claim an oven to be of a certain wattage, within a negative 50 Watts range, to take account of component tolerances (e.g. the capacitor +/- 3%). In addition, as the internal components (magnetron and high voltage transformer) heat up the oven loses power. Depending on oven design and heating time duration, this can be another 50 Watts, making an 800 Watt oven a 750 Watt oven or less. The NPD Kitchen should be treated as a food testing laboratory, where use of the appliances for personal requirements should be prohibited. It can take up to 6 hours at ambient temperature for the oven to cool down. This means that consecutive product heating should always be checked to ensure it has reached the recommended safe serving temperature.

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## COMING EVENTS

- IMPI 49th Annual Microwave Power Symposium, 16-18 June 2015 at Kona Kai Resort, San Diego, California, USA. *Web [www.impi.org](http://www.impi.org)*
- AVEX international 2015 Vending and Water Exhibition will be at Manchester Central Convention Complex between 30 June and 1 July 2015. *Web [www.avexshow.co.uk](http://www.avexshow.co.uk)*
- European Microwave Week, Palais des Congrès, Paris, France which occurs between 6-11 September 2015, with 3 days of exhibition and 3 major conferences. with associated workshops, exhibitor workshops and seminars. *Web [www.eumweek.com/](http://www.eumweek.com/)*
- London Speciality & Fine Food Fair, at Olympia National, Hammersmith Road, London, 6-8 September 2015 *Web [www.specialityandfinefoodfairs.co.uk](http://www.specialityandfinefoodfairs.co.uk)*
- The Restaurant Show, formerly at Earls Court 2, is now moving to Olympia with a complementary show called 'The Conscious Hospitality Show' and will run between 3-7 October 2015. *Web [www.therestaurantshow.co.uk](http://www.therestaurantshow.co.uk)*
- BBC Good Food Shows I.e.

11-14 June	NEC Birmingham
29-31 August	Hampton Court Palace
6-8 November	SECC Glasgow
13-15 November	Olympia London
26-29 November	NEC Birmingham

*Web [www.bbc.goodfoodshows.com](http://www.bbc.goodfoodshows.com)*



## WHISTLING TIMER PACKAGES

### Two Different Approaches

In April 1987, Japanese food manufacturer Nakamura introduced a container with a whistling device for cooking food in a microwave oven. A shallow, plastic cup is bonded to the container's lid. Both the cup and the corresponding part of the lid have a small hole. When the food approaches its proper cooking time, the whistling sound occurs as steam passes through the space between them. This development overcame the major limitation of so-called *Doneness Indicators* - the difficulty in knowing whether or not a colour change had occurred without opening the microwave oven.

Almost 20 years later, Swedish company Micvac developed a "whistling valve" in the lidding film on a sealed plastic tray. As steam from heated food passes through it, the sound occurs. The valve comprises a slit or hole in the film covered with an adhesive tape or label (ideally elasticated). The adhesive system has two elements - the one nearest the food opens at a lower temperature than the other. Steam passing through the opening in the film begins to create a pressurised space, forcing the covering tape or label upwards.

At this point, the food is unlikely to be sufficiently heated. Continued heating to the correct food temperature produces a much greater amount of steam. The second adhesive layer opens. Steam passes through making the area around the opening oscillate and emits a whistling sound.

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**Highlights 2011 Summer Issue**

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