

## CASE STUDY – FOOD PROCESSING

Food manufacturers are required to monitor and record Critical Control Point (CCP) information as a part of a compliant HACCP (Hazard Analysis and Critical Control Point) system. Record-keeping is critical to a food safety auditor's determination of compliance.

Depending upon the type of food being processed the critical control points will change. The safety of some products is temperature dependent whereas for others sanitizing is critical to ensure bacteria counts are at the required level prior to the product being frozen or chilled for transport and sale. In the poultry processing industry for example, both temperature and sanitization are critical to effective production.

Current practices of determining the operating quality of sanitized water in the poultry processing industry requires the periodic measurement of free chlorine and pH. From an operational standpoint, automated measurement of pH is practical and already in place in many applications. Much thought must be given to the sampling method as pH probes can notoriously become saturated with fats and greases and perform sub-optimally as a consequence. Automated measurement of free chlorine however requires expensive apparatus and fats or oils once again need to be considered for their impact on probe efficiency. This has traditionally made automated monitoring solutions problematic and expensive!

Current practical methods of data collection involve manual immersion of sensitive strips followed by colour matching to standards or involve the use of hand-held probes. These methods cannot provide alerts when water parameters are changing nor can a manufacturer be certain the readings are being consistently taken from the same point. The method is also limited by the ability to match colours by eye and relies upon people not forgetting to sample. The method often results in over-dosing of chlorine because of its inherent imprecision.

**An alternative method of determining the sanitizing quality of the water is to utilise the measurement of ORP (Oxidation Reduction Potential) along with the measurement of pH.** ORP is a direct measure of the effectiveness of the free chlorine in the water and varies with changes in chlorine levels and also with changes in pH. Harvard University has concluded and published the recommendation that ORP levels for poultry sanitization be above 625mV. As measurement of both pH and ORP can be mechanized, a continual monitoring process has been developed by DAN that can be implemented with alarms generated by changes being sent in real time. **The financial benefits are in reduction in chlorine usage (and cost) reduction in sampling labour cost and improved sanitizing leading to the option for shelf-life extension. The food safety benefits come from greater control over a critical process.**

**As can be seen from the sample data below, DAN presents an AVERAGE, a MAXIMUM and a MINIMUM for each reporting period, for**

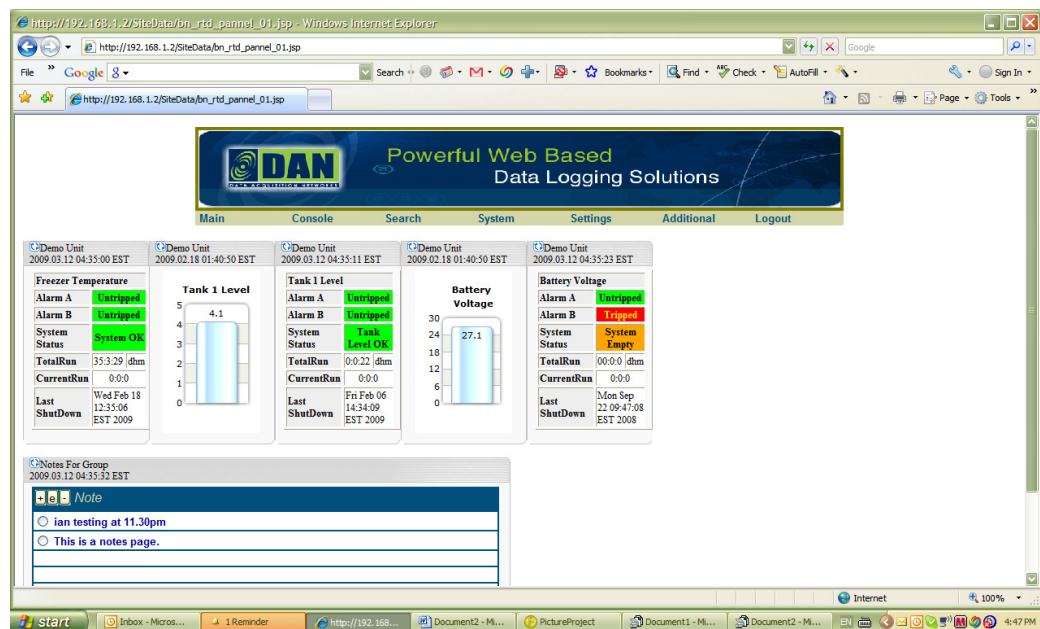
each critical control point. DAN systems automatically generate the information necessary to fulfill the requirements of HACCP record-keeping.

## SAMPLE PROCESSOR

Dan Server Data			Tank #1 pH			Tank #1 ORP		
Date	Time	GMT	Aver	Max	Min	Aver	Max	Min
22/05/2007	10:30	1000	7.1	7.1	7	730	778.8	693.8
22/05/2007	10:00	1000	7.1	7.2	7.1	712.5	778.8	690
22/05/2007	9:30	1000	7.1	7.2	7.1	705	712.5	698.8
22/05/2007	9:00	1000	7.2	7.2	7.1	713.8	722.5	705
22/05/2007	8:30	1000	7.2	7.2	7.1	728.8	758.8	707.5
22/05/2007	8:00	1000	7.1	7.2	7.1	747.5	758.8	736.2
22/05/2007	7:30	1000	7.1	7.2	7	800	835	748.8
22/05/2007	7:00	1000	7.2	7.3	7.1	683.8	810	662.5
22/05/2007	6:30	1000	7.2	7.3	7.2	677.5	686.2	668.8
22/05/2007	6:00	1000	7.3	7.3	7.2	692.5	711.2	676.2

The system provides data available for viewing on a web site accessible from any computer via the internet (Passwords and login ID's protect the data). **In addition, alarms may be generated by email and SMS to preset conditions also input via the internet.**


DAN has also developed an Operator's Console view that can be used within a factory by Supervisors, Quality Controllers and Operators to constantly monitor the process at a glance.



The above graphic is representative of the DAN Console view.

## SCIENTIFIC EVIDENCE

There is a significant 'body' of scientific literature available describing the benefits of ORP monitoring for the poultry industry. The table opposite shows the relationship between ORP and the survival time of bacteria and leaves little doubt that ORP monitoring is of critical value to the poultry industry.



Summary of results from various lab simulation and commercial studies

Survival in seconds (s) or hours (h) at ORP (mV)

Pathogen/Indicator	< 485	550 < x < 620	> 665
E.Coli O147:H7	> 300s	< 60s	< 10s
Salmonella spp.	> 300s	> 300s	< 20s
Listeria monocytogenes	> 300s	> 300s	< 30s
Thermotolerant coliform	> 48h	> 48h	< 30s

DAN MONITORING & THE AUSTRALIAN POULTRY INDUSTRY

Before DAN developed the ORP monitoring system for poultry processing, automated monitoring was cumbersome, expensive and unreliable. Similarly, manual monitoring and record-keeping was a less than ideal solution.

DAN currently sells and installs food processing equipment at a fraction of the cost of alternatives and is proud of what it has achieved whilst working hand-in-hand with major manufacturers.