Benefits Of Remote Monitoring In Meat Processing

Dave Johnson, Senior Software Engineer, Matrix Product Development

This article originally ran in the November/December 2012 issue [1] ***of*** **Food Manufacturing.**

Remote temperature monitoring in meat processing applications can provide processors with a wealth of benefits in the areas of food safety, process efficiency and brand integrity.

Remote monitoring is exciting technology for meat processors. The benefits are numerous, including better yields and increased profits, less raw material waste due to improper cooking, product consistency, energy savings, Hazard Analysis and Critical Control Point (HACCP) compliance, improved worker safety and reduced liability. The initial costs of a wireless temperature monitoring system will offer a large return on investment in a short amount of time.

Wireless temperature monitoring is the answer to achieving the benefits described above. These systems are usable worldwide for quality control. Prior to cooking, a wireless probe is inserted into the center of a meat product, and the internal temperature of the product is taken throughout the cooking cycle. Every meat processing line is different, with various moving parts and storage chambers. The wireless temperature monitor stays with the product throughout the process, even processes that last 24 hours or more.

Beginning when the meat is placed onto a rack, the internal temperature can be

monitored in real time. Real time means during the cooking process, not just after the cooking cycle is finished and a problem is uncovered. A workstation or data logger outside of the cooking oven or chilling chamber can alert workers immediately if the product falls outside the required temperature range. The attached temperature probe is capable of being on the product throughout the entire process. After the product is finished in the final chilling cycle, the probe is removed, washed with a cleaning solution, along with equipment, and can be ready for the next cycle.

Examining monitoring methods

In contrast, a wired temperature probe cannot be placed on a product moving on a conveyor, or moving from chamber to chamber as found in meat processing plants. There are also “puck” probes that sit outside the product. This approach is limited because it gives information after the process is complete and sometimes does not measure the internal temperature of the meat. Once the process is complete and the meat is ruined, money is lost. Another option is an infrared radiation thermometer, however these are expensive, operate at a short distance and only measure the surface temperature, not the interior of the meat. Additionally, the surrounding surfaces limit the range and usability of infrared radiation thermometers. Depending on the application and environment, wireless temperature monitoring using a thermocouple, resistance temperature detector (RTD) or thermistor are superior choices for verification procedures.

Meat products that are cooked to the proper temperature and are not overcooked retain their water weight and therefore have better yields. This immediately increases profits. And should equipment malfunction during the cooking cycle, automatic monitoring can signal a technician, allowing an opportunity to correct the issue before more raw product is lost. Downtime of cooking equipment has an adverse effect both on meat awaiting processing and worker productivity.

Products have better brand integrity when end-customers can count on consistency. As ovens and storage areas maintain constant temperatures, meat products arrive in a uniform manner. Monitoring may even show where processing times can be shortened while still having a fully prepared end product. This savings in time and electricity does not affect HACCP compliance, but rather augments it. Worker safety is also improved because workers no longer have to go into hard to reach areas, where there may be moving or hot parts. On one room-sized oven, the only access point is a door in the middle section where workers reach in to read temperatures. Doing so exposed the workers to steam and high heat. Lowering the number of times the door is opened helps prevent contamination from the outside and decreases risks. Installing wireless probes allows a business to reduce liability and sanitary risks.

Meeting flexibility demands in process monitoring

Meat processing plants are unique because all businesses operate differently and the equipment varies between plants. Each meat product requires a different set of control points, heating and cooling times, and cleaning facilities. Although the

processing plants vary in size and layout, they have common areas such as ovens and chilling stations. It is within these areas that temperature monitoring is important. Processing meat involves keeping stock at temperature for long periods, sometimes days, before the next step can be taken. Maintaining chilling conditions over a space of a warehouse is best accomplished automatically to minimize microbial growth.

Any equipment that enters the processing facility must function in harsh environments. The processing environments and all foreign objects within them need to be kept clean and cannot have any loose parts that can fall off. Any electronic device needs to be washed down in chemicals and immersible in water. It cannot trap food particles in crevasses. There can be a high moisture level and harsh chemical wash-down processes. Enclosures should not outgas or introduce lubricants or additional contaminants to the process. Opening electronics cannot be done on the factory floor and battery replacement should be minimized.

Ron Pulvermacher, President of Matrix Product Development states, “Meat processing plants pose special challenges for wireless electronics due to large swings in temperatures that electronics need to function in, as well as moisture, cleanliness and robustness, including making products drop-proof.” Drop-proofing of any equipment used in the process turns out to be important because the floors are usually hard surfaces. When workers wear gloves in a high-moisture environment, items get dropped frequently. Some environments may have up to 95 percent relative humidity at freezing temperatures.

Some accommodations are necessary for a wireless solution. Metal walls on cooking ovens or freezers may interfere with wireless signals. Additional antennas to pick up the signal can be installed. Few are necessary and once placed, they require little maintenance. And as with all equipment, inspections and periodic calibrations are necessary.

Much of the processing equipment is expensive and custom made, so problems that do occur need to be fixed in short order. Ovens do not heat instantly, nor do chilling chambers cool on the spot. Wireless temperature monitoring and sampling can give an indication of an issue before it becomes critical. The earlier a problem is detected, the less it costs in correction and lost productivity. Reports for operational trending can factor into more insightful decisions as well. For example, chilling chambers need to work harder keeping cool during warmer days or when warm stock is added. Identifying these trends and automatically making fine adjustments reduces discrepancies.

The future of remote monitoring

Extending the wireless temperature monitoring to mobile devices is the obvious next step. As mobile devices replace PC workstations, text messages and alarms are always within arm’s reach. Automated monitoring can even preemptively signal what troubleshooting steps are required, or if only minute adjustments are called for. Wireless signals may be listened to by several data loggers, simultaneously coordinating corrective action. In a multilingual facility as well as any facility, there

is a benefit of streamlined, precise communication.

Wireless temperature probes make an ideal solution for remote monitoring and can be deployed today. It allows workers and managers to maintain equipment in correct operation specifications. It shows in real-time the state of the meat product. Any deviation could trigger an alert, thus making for consistent, high-quality products. An investment in a wireless temperature monitoring system provides benefits beyond just financial. It reduces risk, dramatically improves safety and makes a better meat product.

Source URL (retrieved on *09/24/2014 - 1:03am*):
http://www.chem.info/articles/2013/04/benefits-remote-monitoring-meat-processing?qt-recent_content=0

Links:
[1] http://e-ditionsbyfry.com/Olive/ODE/RFM/Default.aspx?href=RFM%2F2012%2F11%2F01&pageno=28&view=document