



SNAPSHOT

IMPROVED TRACEABILITY AND QUALITY CONTROL FOR MEAT PRODUCTS USING RFID

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Project Description

Radio Frequency Identification (RFID) has been identified as a technology which may offer the capability of automating the verification process of individual primal pieces within a carton and eliminate human error from the manufacturing process, particularly in relation to product identification and product counts.

The aim of this project was to establish the technical feasibility of using a UHF RFID Tunnel Reader to detect RFID label tags attached to meat products with high accuracy.

Project Content

The UHF frequency band offers long read ranges in comparison to other frequencies used in RFID and offers a good solution when tracking multiple products when passing through a defined space. However, one challenge with UHF RFID implementations is that RFID tags present in high moisture environments or attached to high water-content items such as meat products result in attenuation of read range performance.

This project involved evaluating the performance of UHF RFID antennas and tags attached to meat products, with their potential application in providing real-time product identification for downstream processes such as rejection lines.

Project Outcome

The outcome of the project was to assess the viability of UHF RFID technology for use on meat products. An RFID Tunnel Reader was used during the project. Cartons of primals were placed on a moving platform that passed through the RFID tunnel reader on rails. This test setup was used to simulate a meat processing production environment.

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A key conclusion from the project was that UHF RFID proved reliable in its ability to detect RFID passive tags on meat products when the following conditions were met:

1. The choice of RFID passive tag is critical – not all tags are the same. It is crucial to use a tag that is optimised for use on meat.
2. The position of the RFID passive tag in relation to the meat provided significant improvements on outer edges of meat in comparison to having the RFID tag on the centre of the meat. Improved RSSI values were measured across all meat products used during the project when RFID tags were applied in this configuration. This improvement is likely attributed to the improved visibility of the RFID tag in relation to the RFID antennas.
3. The packing configuration of the meat would impact the RFID tags ability to activate and cause missed reads of RFID tags. This was most predominantly caused by larger, thicker portions of meat as they detuned the RFID field to a greater degree than thinner portions of meat and prevent the RFID tags from activating. To circumvent this, the packing configuration was adjusted to prevent the RFID tags from being situated in between these portions of meat, and provide greater visibility of the RFID antennas.
4. The speed at which the moving platform carried the meat would impact performance of the RFID tags, with a speed of 0.5m/s achieving consistent read rates of over 90% for an optimal configuration. Slower speeds would provide a greater opportunity for the RFID field to activate the RFID tags, but would have diminishing returns in terms of readability.

The results obtained from the proof-of-concept testing are very encouraging and have shown that UHF RFID is suitable for use on meat products when the positioning of the meat and location of RFID tags can be controlled.

Further validation of the efficacy of the technology in real-world production environments is recommended as the next phase of assessing the commercial value of RFID technology to the meat processing industry.

Benefit for Industry

The adoption of UHF RFID technology in food supply chains has been considered for many years, but has often met technological issues due to inherent physical constraints of RFID systems operating in the UHF spectrum. Improved RFID tag sensitivities, available with new generation UHF integrated circuits and high-

performance RFID tunnel readers now enable RFID read performances suitable for many agribusiness applications.

RFID is proving to be a powerful technology for the meat processing industry to enable:

- Improved automated rejection lines for missing or extra products during processing
- Supply-chain traceability digitalized for ease of tracking and identification of shipments for international and domestic locations.
- Improved visibility of products within the system to assist in determining if products near expiration or products required for recall.