Snapshot Report

AMPC Final Report Snapshot

Micro-X Red Meat CT Scanner Project

Project Code
2021-1208

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Project Description

The aim of the Micro-X AMPC Project was to investigate and demonstrate how Micro-X's Carbon Nanotube Technology (CNT) could be used in the automation of meat processing on behalf of the Australian Meat Processor Corporation (AMPC).

A High-Level Architecture for a possible solution was proposed, and based on this architecture a series of scans were taken on meat samples of various sizes and thicknesses. The scope of the scanning activity was to demonstrate that Micro-X's CNT technology is sufficient for the purposes of an automated scanning system and to assist in determining the optimal number of tubes, scans and the mAs required.

Project Content

The project consisted of the following stages:

- Initial Research: Review of past CBCT work. Exploration and evaluation of solution options to develop a roadmap.
- Concept Design: Evaluation of possible Micro-X CBCT applications followed by agreement on scanning plan for imaging review.
- Imaging Acquisition: Using Micro-X CBCT Testbench for imaging of purchased meat samples.
- Imaging Review: Review of acquired CBCT image data. Implementation of feasible modifications to scanning protocol. Report recommended improvements and optimization opportunities.

Project Outcome

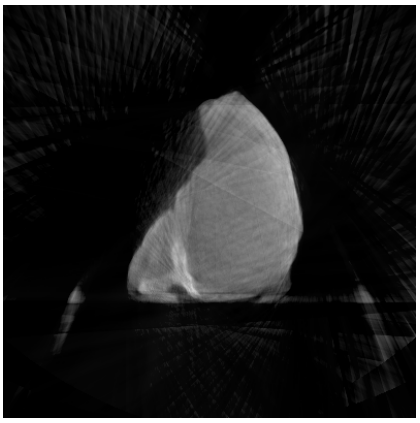

Figure 1: Beef Loin with Chine Bone

Figure 2: Tomahawk Steak

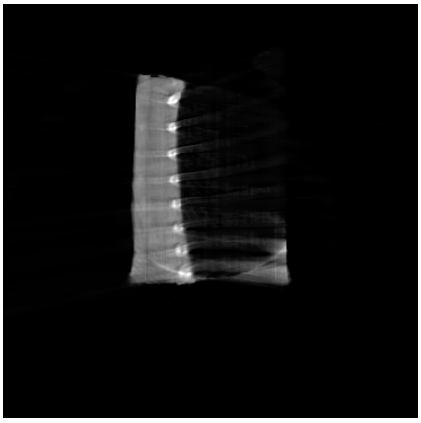

Figure 3: Lamb Ribs Not Frenched

The imaging trial using Micro-X's CBCT imaging testbench successfully demonstrated that the technology and proposed imaging architecture are feasible for the meat processing application. The scans of the meat samples demonstrated the ability to view bone definition and distinguish soft tissue in the images. The results provided valuable insights into the optimal exposure settings, detector linearity, and the scanning process. However, it was acknowledged that further optimization of the imaging system and reconstruction algorithms is necessary for improved image quality and to reduce the impact of imaging artefacts.

The recommended next stage of project activity is:

1. Optimise Imaging reconstruction using PWLS and scatter suppression algorithms in development.

2. Construct a Concept Prototype for true representative CBCT imaging as per the concept designs, with a high frame-rate flat panel detector and a multi-tube tower, based on a previous design developed by Micro-X for baggage scanning. This prototype would make use of the exposure settings identified in this report for meat imaging. The prototype would be used for controlled/supervised testing in the factory environment but is not intended for integration into the production line.
3. Construct an Integrated Prototype suitable for verification in the meat production line, optimised for throughput and size, but without the full design for manufacture and reliability built in. This could be used for a longer-term trial in the factory location.

Benefit for Industry

The successful implementation of Micro-X's CBCT solution in the meat processing and packaging industry will be beneficial to the Australian Red Meat Industry, aligning with their strategic goals, which are:

- Increased safety through hands-off meat processing.
- Enhanced profitability through more accurate processing.
- Acquisition of product information and leverage of data insights.
- Improved staff retention by making tasks more interesting.
- Development of tasks requiring higher skill and intellect.
- Reduction in the need for high-risk processing operations.
- Automation and greater efficiency in meat processing tasks can be achieved by integrating CBCT scanning technology, allowing for data-driven decision-making and optimization of cutting systems.