Snapshot Report

Small Footprint DEXA

Small Footprint DEXA – Stage 2

Project Code
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Prepared by
Jonathan Cook, Kristian Guard, Todd Enfield, Allan Miranda

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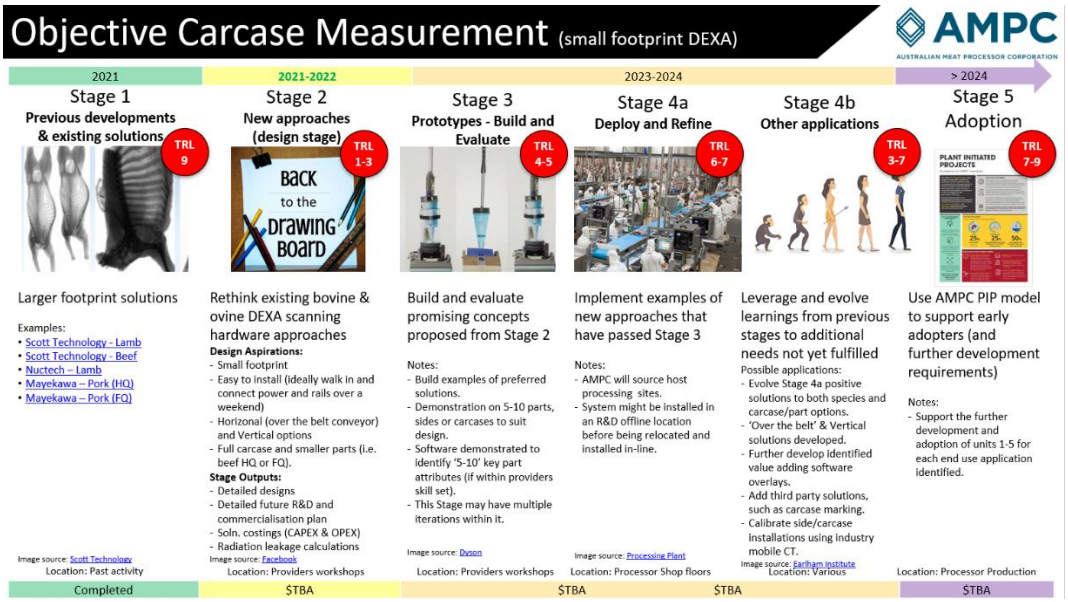
Project Description

The Australian red meat processing sector (bovine, ovine, and caprine) has always looked towards the European pork industry for automation and technology advancement insights. Those of us that have worked in the Australian red meat R&D areas (either as investors or developers) have always been challenged as to why we are perceived to be lagging behind the slaughter floor and boning room automation solutions that we have seen in the European pork processing sector.

One technology that has been developed for the industry that has substantially enabled the development of some processing automation and information solutions (such as those noted above), has been full lamb carcase or full beef side continuous x-ray (Single Energy and Dual Energy) systems.

AMPC issued an innovation challenge asking providers to rethink x-ray design for the smaller footprint required for greater uptake in the Australian red meat processing sector.

To provide guidance in the AMPC proposed stages of development for this area of innovation, AMPC has drafted the following Theme on a Page.



The output of Stage 2 is a detailed design, sufficient to (1) demonstrate to AMPC staff the working functionality of the concept(s), (2) develop indicative targeted $RRP, (3) demonstrate theoretical x-ray shielding calculations, and (4) draft a Stage 3 application submission, which includes an indicative indication of Stage 4+ and commercialisation plan.

Project Content

The methodology for conducting the project was as follows:

- Perform initial x-ray design – engagement with suppliers and selection of suitable equipment for the concept, design of scanning geometry required
- Draft initial layout
- Mechanical design for all mechanical components, including quoting
- Sensing design for all sensing requirements, supplier engagement and selection, and quoting

- Electrical design for all controls and electrical equipment required, supplier engagement and selection, and quoting
- Detailed cycle time analysis and simulations
- X-ray shielding and safety design
- Finalise layout and determine scope required for site works
- Develop schedule and costings for development, initial systems, and repeat systems, including commercialisation plan

Project Outcome

In approaching AMPC's innovation challenge through this project, Intelligent Robotics have developed a design for a carcase x-ray scanning machine to address the inspirations of the AMPC innovation challenge. In relating back to the objectives that were established for the project:

1) **Develop a carcase DEXA concept and assess its alignment with the following aspirations: modular (applicable to a range of processing plants from an ROI perspective), with scalability assessed for increasing units in series and in parallel in terms of throughput rates and cost; smaller footprint; and simpler installation**
   The concept has been designed with these aspirations as key design criteria.
2) **Perform design and equipment selection tasks to provide accurate costing for the cell concept in terms of commercial price and cost of further development**
   The designs of the concept have been progressed to the point of allowing reasonable estimates to be made of target commercial pricing, as well as the work required for development. A scope of supply and costing has been provided for the initial systems reflecting this, which would form the structure for a sales proposal in the future.
3) **Detail accurate layout designs to enable costing for site works requirements for processors**
   During this project, the designs were progressed enough to provide an accurate layout of the system. In this report, the scope of site works required was then outlined, with the primary components being railworks and any required building modifications (if needed). The exact scope of these will be site-dependent.
4) **Perform detailed cycle time analysis with concept for different cut configurations, including simulations**
   Simulations of the concept throughout its design were built and used to evaluate the system as well as factors such as positioning of cell walls and sensors.
5) **Investigate Hot vs Cold carcase processing by the system**
   The system maintains the same design for hot or cold carcase processing. Depending on the application (e.g. lean meat yield measurement vs cutting), and the type of cattle produced by the plant, the side stabilisation time may vary slightly which will need to be accounted for in the system throughput rate. The machine itself however will remain unchanged.

In this project, the commercial aspects of the Small Footprint DEXA concept were investigated. The concept was also reviewed against the initial inspirations for the project as well as the project objectives. The concept has been

developed to the point where the next step would be customer engagement for a project, the structure of which has been outlined.

The project has produced a detailed concept for a Small Footprint DEXA system. Processor feedback was sought on the concept as a mechanism for driving scribing automation. While the concept was viewed positively, and is significantly smaller and simpler than existing solutions, the footprint and cost required were still too large to proceed with the processors that were approached. Currently, alternative sensing technologies are being evaluated for the purposes of driving cutting automation. As these assessments progress and the realisable benefits of these alternative sensing technologies to x-ray become known in the context of scribing, the next steps for the Small Footprint DEXA concept developed in this report may be to explore other areas such as performing cuts which can't be sensed alternatively (e.g. requiring sub-surface features), focussing on lean meat yield evaluation, quarter-processing (which requires a smaller machine), or specifically targeting customers wanting scribing yield gains above and beyond what the alternative sensing technologies can provide and have sufficient space in their plant.

Benefit for Industry

AMPC's 2020-2025 Strategic Plan identifies both within the Advance Manufacturing (pages 5 & 6) and People and Culture (pages 10 & 11) programs that address:

1. Removing staff from dangerous operations, via Hands-Off processing (Adv. Mft.),
2. Carcase Primal Profitability Optimisation, via accurate processing (Adv. Mft.)
3. Digitisation, via acquiring product information and leveraging data insights (Adv. Mft.),
4. Retention, via improving working conditions and making tasks exciting (People & Culture),
5. Development, via developing tasks that require higher skills and intellect – operational & technical (People & Culture),
6. Safety and Wellbeing, via reducing the high-risk nature of processing operations (People & Culture),

are all foci of AMPC, and that this (Small Footprint DEXA) is one innovation theme will aim to make a significant impact upon all six.

This project sought to rethink x-ray design for the smaller footprint required for greater uptake in the Australian red meat processing sector.