AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

Automated Beef Scribing

Automated Beef Scribing – Stage 2

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Project Description

The first iterations of the beef scribing automation resulted in a semi-automated system being evaluated at NCMC. Information on this development can be located at this link - **Semi-Automated Scribing development**. Although this system did not remain in operation it did demonstrate the benefit of achieving accurate cut lines and removing operational staff from this dangerous task. A semi-automated approach is still an important offering for some processors and as such AMPC has a separate Innovation Challenge under the heading of Gamification to address this market need, see **Remote Operations (Gamification)**.

Machinery Automation and Robotics (MAR) then worked with **JBS** (funded by MAR, JBS, AMPC, MLA & the Australian Federal Government) to evolve this concept into an automated solution. The solution details can be located at this link - **Automated Scribing development** and is still in operation at JBS today.

To this end, AMPC sought engagement from researchers and commercial developers to work with AMPC and the industry to understand if the current offering could be improved upon. To provide guidance in the AMPC proposed stages of development for this area of innovation, AMPC has drafted the following Theme on a Page.
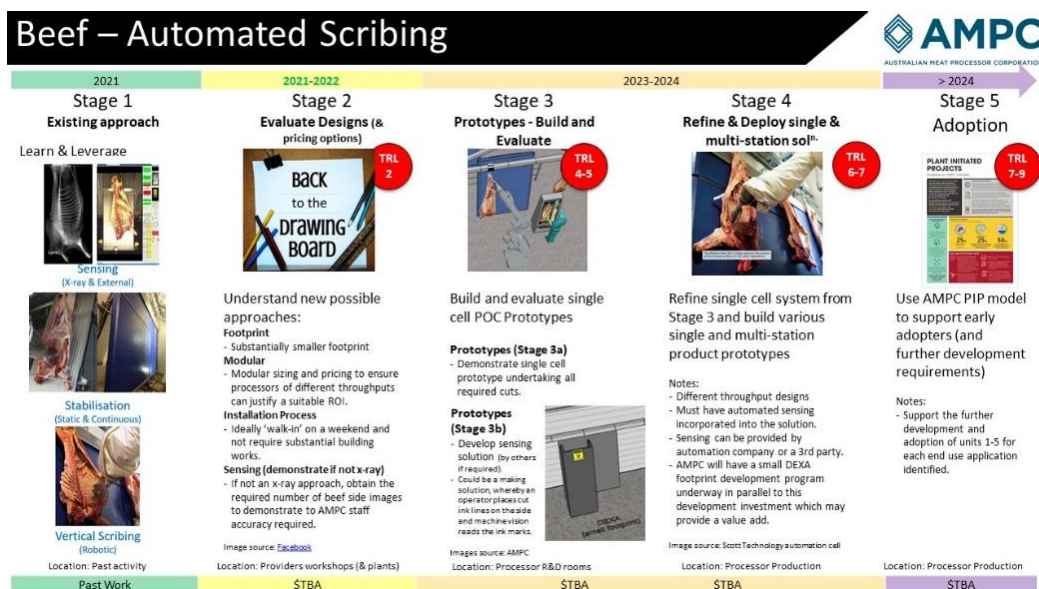
Stage 2 will enable robotic/machine development companies/integrators/researchers to work with AMPC and Industry to ascertain if the following is achievable as a design for an automated beef scribing solution for the Australian industry that achieves the following aspirations:

1. Modular (applicable to a range of processing plants from an ROI perspective)

2. Smaller footprint (both x-ray and robotic cell components)

3. Ability to 'walk-in' the solution and install on a weekend.

Project Content

The methodology for conducting the project was as follows:

1. Perform robot selection – engagement with supplier and selection of suitable equipment

2. Draft initial layout

3. Mechanical design for all mechanical components, including quoting

4. Saw tool design and selection for most appropriate cutting tool(s), supplier engagement and selection, and quoting

5. Sensing design for all sensing requirements, supplier engagement and selection, and quoting

6. Electrical design for all controls and electrical equipment required, supplier engagement and selection, and quoting

7. Detailed cycle time analysis and simulations

8. Finalise layout and determine scope required for site works

9. 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 beef scribing system to address the inspirations of the AMPC innovation challenge. In relating back to the objectives that were established for the project:

1. **Develop an automated scribing concept and assess its alignment with the following aspirations: Modular (applicable to a range of processing plants from an ROI perspective); Smaller footprint; Simpler installation; and Able to perform a number of cuts**

   The concept has been designed with these aspirations in mind as key design criteria. The concept consists of a number of variations and is able to be driven by different sensing modalities allowing these aspirations to be addressed while maintaining maximum coverage for the technology across the Australian red meat industry.

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 design of the concept was developed to a detailed enough level to enable accurate costings to be developed. The design for the different concepts were outlined in detailed, as well as the expected commercial $RRP for each concept, and a detailed outline of what the initial projects may look like in terms of costing and structure.

3. **Detail accurate layout designs to enable costing for site works requirements for processors**

   Following on from the previous point, footprint and layout designs were developed for the variations of the scribing concept. This was taken to the next level of detail while outlining what an initial project may look like and outlining what the scope of supply for the processors may be (primarily the rail works, and any building works required).

4. **Perform detailed cycle time analysis with concept for different cut configurations, including simulations**

   In this project, the concepts were modelled with simulation software to determine accurate cycle times for different cutting configurations at different throughput rates. These simulations also helped drive the design by identifying any reach issues/singularities with the robots and ascertaining where the robots should be located with respect to the carcase stabilisation mechanism. They also allowed the positioning and fields of view for the sensors to be confirmed, together with any potential occlusion issues with the robot.

5. **Investigate Hot vs Cold carcase processing by the system**

The requirements of the concept were developed for processing hot versus cold carcases.

Intelligent Robotics is working with a number of processors to tailor the concepts for their operations, with the target of progressing them into projects for full production installations.

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:

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

are all foci of AMPC, and that this one innovation theme will aim to make a significant impact upon all seven.

In a recent engagement AMPC with over 94% of Australia's beef processing throughput capacity, close to 100% of beef Australian beef processors identified beef scribing in their Top 20 or 100 areas of Innovation they want to adopt within the next 5 years within their business (assuming there is a fit for purpose solution for their business).

As such although the primary goal for the innovation theme is a successful development(s) to enable operational staff to undertake beef scribing without having to hold onto the beef scribing saw, it is expected that all stages and successful development companies will keep in mind both the primary and secondary goals in the context of the above seven strategic plan touch points