Snapshot Report

KPC Scribing Project

KPC Automated Robotic AI Chilled 4-cut Beef Scribing System

Project Code
2022-1185

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Project Description

The KPC Automated Robotic AI Chilled 4-cut Beef Scribing Project was developed to replace the manual scribing process, which is physically demanding, highly skilled, and carries significant safety risks. The project aimed to automate the four key scribing cuts using robotics and AI so the process could be performed more safely, consistently, and accurately at commercial line speeds. This work focused on reducing operator exposure to powered saws, improving cut precision, and supporting more reliable downstream boning and yield performance.

The project successfully designed, built, and installed an AI-driven robotic scribing system at KPC. Using 3D imaging and automated motion control, the system identifies the correct cut locations on each carcase and performs all four scribing cuts with high accuracy. The system has demonstrated strong performance, improved safety, and consistent yield benefits, providing a proven model for the wider industry to adopt similar automation solutions.

Project Content

The project consisted of following stages,

- **Initial Research**: Review of manual scribing challenges, safety risks, yield variability, and labour dependency across KPC operations. Assessment of automation feasibility using robotics and AI vision for chilled carcase processing.
- **System Design**: Development of the robotic scribing concept, including mechanical design, AI vision architecture, and robot path planning. Creation of simulations and a digital twin to validate accuracy and motion control before installation.
- **Factory Testing**: Execution of controlled testing on the IR-SCRIBE prototype, including vision calibration, software validation, motion trials, and safety system checks to confirm readiness for site installation.
- **Site Installation & Commissioning**: Installation of the full robotic system at KPC, followed by dry and wet commissioning to verify performance under commercial operating conditions.
- **Performance Validation**: Independent accuracy and yield testing using Greenleaf's audit methods, confirming cut accuracy and consistent throughput.
- **Operational Support**: Completion of a two-year support period including optimisation, AI tuning, operator training, and long-term reliability monitoring.

Project Outcome

The KPC Automated Robotic AI Chilled 4-cut Beef Scribing Project successfully demonstrated that robotics and AI can replace manual scribing with high accuracy, improved safety, and consistent performance at commercial processing speeds. The IR-SCRIBE system met or exceeded all technical objectives, delivering measurable benefits in yield improvement, worker safety, and operational reliability. The results confirm that automated scribing is a viable and scalable solution for modernising beef processing operations.

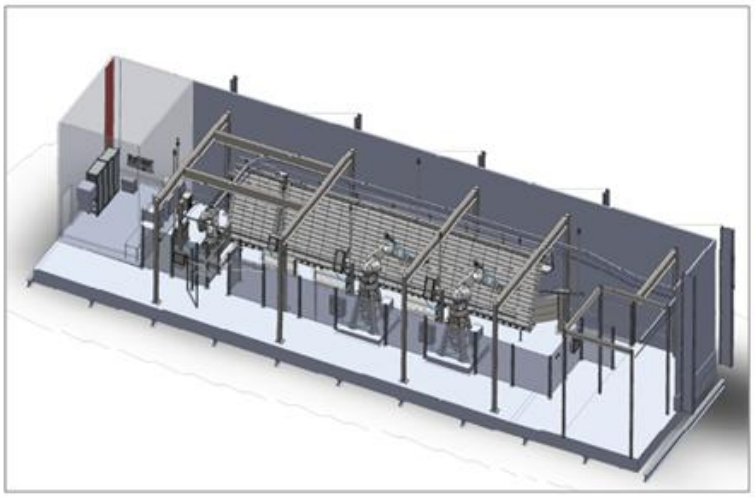

Figure 1: 3D Proposed scope

Figure 2: Actual IR-Robotic solution

Key outcomes achieved include:

1. Full automation of four major scribe cuts using AI-driven vision and robotic precision.
2. Cut accuracy exceeding the project's performance target.
3. Improved yield consistency, with reduced cut variation and measurable commercial gains.
4. Elimination of manual saw use, significantly enhancing operator safety and reducing high-risk tasks.
5. Stable system performance, with validated uptime and strong reliability during production.
6. A proven automation model that provides the industry with a clear pathway for broader adoption of robotic scribing systems.

Benefit for Industry

The successful implementation of the IR-SCRIBE robotic scribing system provides the Australian red-meat industry with a practical and proven solution for improving accuracy, safety, and efficiency in beef processing. By replacing a high-risk, labour-intensive task with automated technology, the project demonstrates how robotics and AI can deliver consistent results at commercial throughput without compromising product quality.

Key benefits to industry include:

- **Improved Safety**: Eliminates manual saw use, removing workers from one of the highest-risk tasks in beef processing.
- **Enhanced Yield and Consistency**: Automated scribing reduces cut variability, leading to more predictable boning outcomes and improved saleable meat yield.
- **Reduced Labour Dependency**: Minimises reliance on scarce skilled operators, supporting plants facing ongoing labour shortages.
- **Operational Efficiency**: Maintains full line speed with high cut accuracy, reducing rework, downtime, and process variation.
- **Commercial Viability**: Provides a validated automation model with strong ROI, enabling processors to adopt advanced technology with lower risk.
- **Scalability and Future Integration**: Establishes a platform for extending automation into downstream cutting, trimming, and quality-assurance processes.