



final report

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Robotic brisket cutter

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Executive summary

The Robotic Brisket Cutting System was installed and commissioned at Castricum Bros in Dandenong Vic during the period October to December 2009. This followed installations of Brisket Cutting Systems at Peel Valley and Burrangong. Improvements were made to:

- The tooling
- Guarding
- Safety Mat Platforms
- Sensors

building on knowledge gained from the previous installations.

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1 Background

The first Automated Brisket Cutter system was developed and installed at Peel Valley Exporters in June 2008 with a second Automated Brisket Cutter system installed at Burrangong Meat Processors early 2009. This system installed at Castricum is the third system developed, with a fourth planned for installation at Gundagai eat Processors later in 2010.

The Automated Brisket Cutter systems being built are part of a 4 stage approach to finalising the development of fully functional automated system in preparation for commercialisation of the development.

Significant changes in design and concept have taken place and are set to continue through continuous improvement of the system design with plant variations, equipment, technology and learning's influencing each stage of the development. Upon completion of each development MAR will commercialise technology for the industry and it is estimated that a minimum of 20+ sites are the potential market for this innovation

2 Project Objectives

- MAR will further develop the robotic brisket cutter solution for the industry and satisfy the speed (10/min) and accuracy and process criteria's specified by Castricum Bros.
- MAR will provide a documented Project risk assessment for review as part of the initial design of the system
- Test and prove the solution at MAR in controlled environment via FAT prior to installation
- Implement into the processing facility a fully functional robotic brisket cutting system
- Commission and trial robot to achieve client specifications
- Train operations and maintenance staff to competency in maintaining and operating equipment.
- Provide to MLA for industry dissemination and promotional purposes full documented reports of the systems success and challenges.

3 Results and Discussion

The Robotic Brisket Cutting System was installed and commissioned at Castricum Bros in Dandenong Vic during October, November and December 2009. The images in Fig. 1 and 2 show the installed system:



Fig 1



Fig 2

Following are the main improvements that were made to the system following learning's from the installation of the Brisket Cutters at Peel Valley and Burrangong.

- Tool modifications to improve carcass stabilization and reduce complexity
- Improvements in guarding to avoid cracking

- No hinged platforms for safety mats
- Sensor modifications

3.1 Tool Modifications

Past Brisket Cutting installations have shown the Carcass Stabilisation and Centring guide design to be bulky, providing catch points and making the saw mechanism difficult for cleaners to wash down.

The Carcass Stabilisation and Centring guide was successfully redesigned to reduce complexity and improve washability of the tool. The redesign also resulted in a reduction in tool weight therefore allowing the robot to move the saw faster hence reduce cycle time.

The figure below shows the old design which incorporated a pneumatic cylinder in a relative complex arrangement.

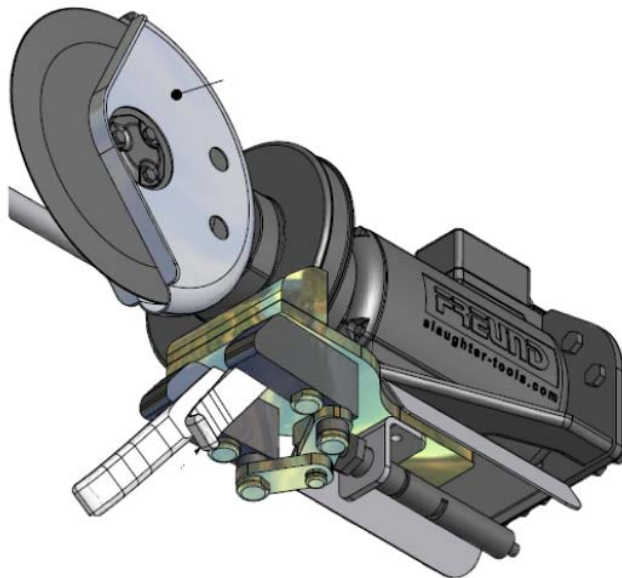


Fig 3

The two images below show the new, much simpler design. Here it can be seen that the cylinder and associated linkages have been replaced by leaf springs which greatly reduce the complexity of the mechanism.

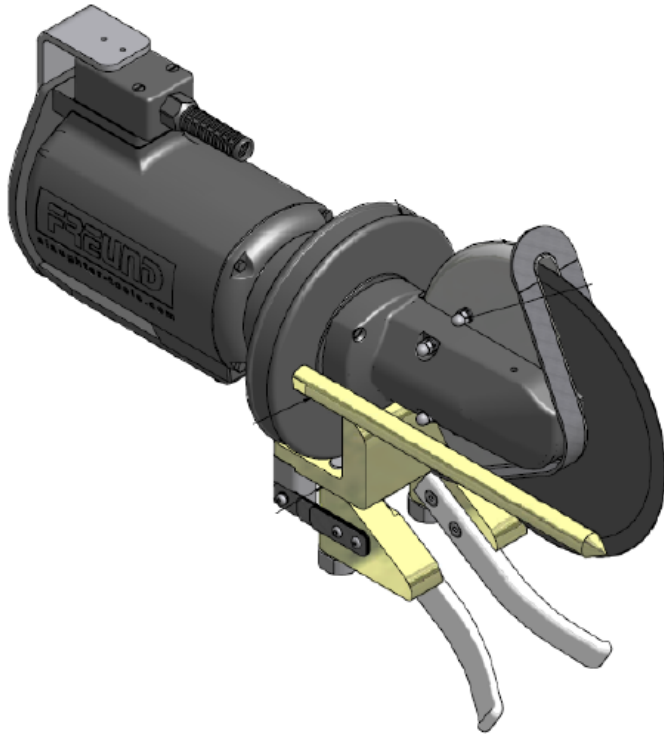


Fig 4

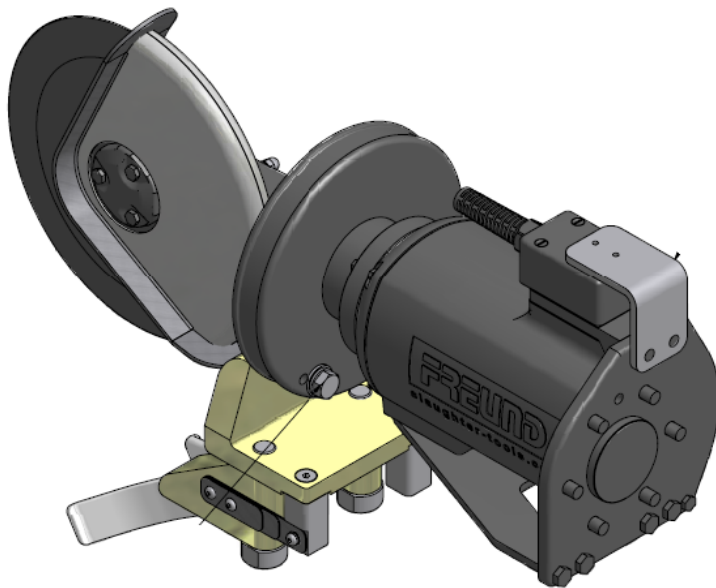


Fig 5

The following image shows the actual assembled mechanism.



Fig.6

3.2 Guarding Improvements

Modifications were made to the method of securing the Perspex guarding in place. It can be seen below in Figures 5 and 6 that the guarding is retained by a 'holder' rather than a clamp allowing the Perspex the ability to expand and contract in line with temperature changes during cleaning without causing cracking. This is an improvement in the old method of holding the Perspex where it was securely bolted into position, Fig.7, and cracking of the Perspex resulted when the Perspex expanded and contracted due to temperature changes.



Fig 7



Fig 8



Fig 9

3.3 Platform Upgrades

For the past projects at Peel Valley and Burrangong the safety mats have been mounted on hinged platforms. This allowed the safety mats to be relatively low to the ground and allowed them to be lifted for cleaning as shown in figures 8 and 9 below.



Fig 10



Fig 11

This has caused issues with faults occurring with the safety switches required to ensure the platform was in the lowered position before production commenced. For the projects at Castricum Bros a change was made to mount the safety mats on fixed platforms shown in figure 10. The platforms were raised higher off the ground to enable cleaning underneath and are fixed in position, hence avoiding the issues with safety switches previously encountered.



Fig 12

3.4 Sensing Upgrades

Due to issues with water ingress into sensors on installations at Peel Valley and Burrangong, sensors have now been placed inside enclosures, as shown in Figure 12 below, to protect them from the high pressure wash down water. In addition the sensors are mounted at a higher position relative to the carcass due to gambrel design and line speed. This will also assist in

eliminating any erroneous readings that may be experienced due to the water and steam from the vac san tool.



Fig 13

4 Success in Achieving Objectives

MAR has successfully achieved the following objectives set out in Section 2 of this document.

- 1) As can be seen from the descriptions in Section 3, MAR has built on knowledge gained from past installations at Peel Valley and Burrangong and further developed and improved the Robotic Brisket Cutting Solution.
- 2) A project Risk Assessment was submitted as part of MS1 for this project.
- 3) The system was tested at MAR and then installed, tested, trialled and commissioned onsite at Castricum Bros.
- 4) Operators and maintenance staff were trained in the operation and maintenance of the system.
- 5) Status and Milestone reports have been provided throughout the course of the project and this report, along with the accompanying videos and photos complete the documentation requirements for this project.

5 Impact on Meat and Livestock Industry–now & in 5 years time

Benefits to be achieved by utilization and continued development of the Robotic Front Vac San System include:

- Improvements in OH&S;
 - Elimination of risk of operator strain injury from the size, weight and repetitive tasking
 - Elimination of dangerous operational practices
- Consistency;
 - Robotic mounting and control of the Brisket Cutting process improves accuracy and repeatability over manual systems
 - Improved sensing technology (laser) and software allows carcass variations to be identified providing a platform to implement variable robot positioning and paths.
- Labour cost:
 - The system will replace 1 unit of labour per shift.
- Line Speed:
 - The system can operate at line speed >10 carcasses/min.
- Species:
 - The Robotic Brisket Cutting System is suitable for use in lamb, sheep and goat processing

Reliability and accuracy, along with processing speed which are critical to the success and acceptance of this technology have been achieved throughout this project.

Production levels at plants such as Peel Valley justifies the investment in a robotic system and the recent inclination for Australian processing plants to participate in robotic developments shows the trend the industry is following towards further automation. This is fuelled by acute shortages in labour supply, which will likely get worse in the future.

6 Conclusions and Recommendations

It is evident from the discussion above that the Robotic Brisket Cutting System that has been installed at Castricum Bros will be a success.