

final report

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Robotic Dual VacSan at Gundagai Meat Processors, Gundagai, NSW

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Executive summary

The Dual Vac San system was installed and commissioned at Gundagai Meat Processors in Gundagai, NSW, between the period of November 2010 and February 2011. While single VacSans have been installed in other abattoirs before, this marked the first time that two VacSans were configured to operate simultaneously on the same carcass.

The Dual VacSan system installed at Gundagai performs a sanitizing/vacuum cycle on both sides of the forequarter of the carcass.

While the system is the first Dual Sani Vac to be installed by MAR, previous installations of single Vac Sans have been taken into account when considering design, install and system improvements.

Improvements made include:

- Tooling
- Guarding & Fencing
- Safety Mat Platforms
- Instrumentation
- Electrical design
- Process Design

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1 Background

Since 2008 Forequarter VacSan systems have been installed at Peel Valley Exporters in Tamworth NSW and Castricum Bros in Dandenong Vic. The systems have consisted of a single robot performing a Vacsan path on the “brisket” side of the carcass forequarter. This path itself has usually included only the legs of the carcass, with a few areas focused on the neck.

The dual system designed for GMP is the most ambitious VacSan System commissioned by MAR to date. Along with both sides of the legs of the forequarter, the dual system also VacSans the top side of the neck, the shoulder area, the brisket, and follows both sides of the rib cage down towards the flanks.

The following pictures represent the agreed Vac San paths.

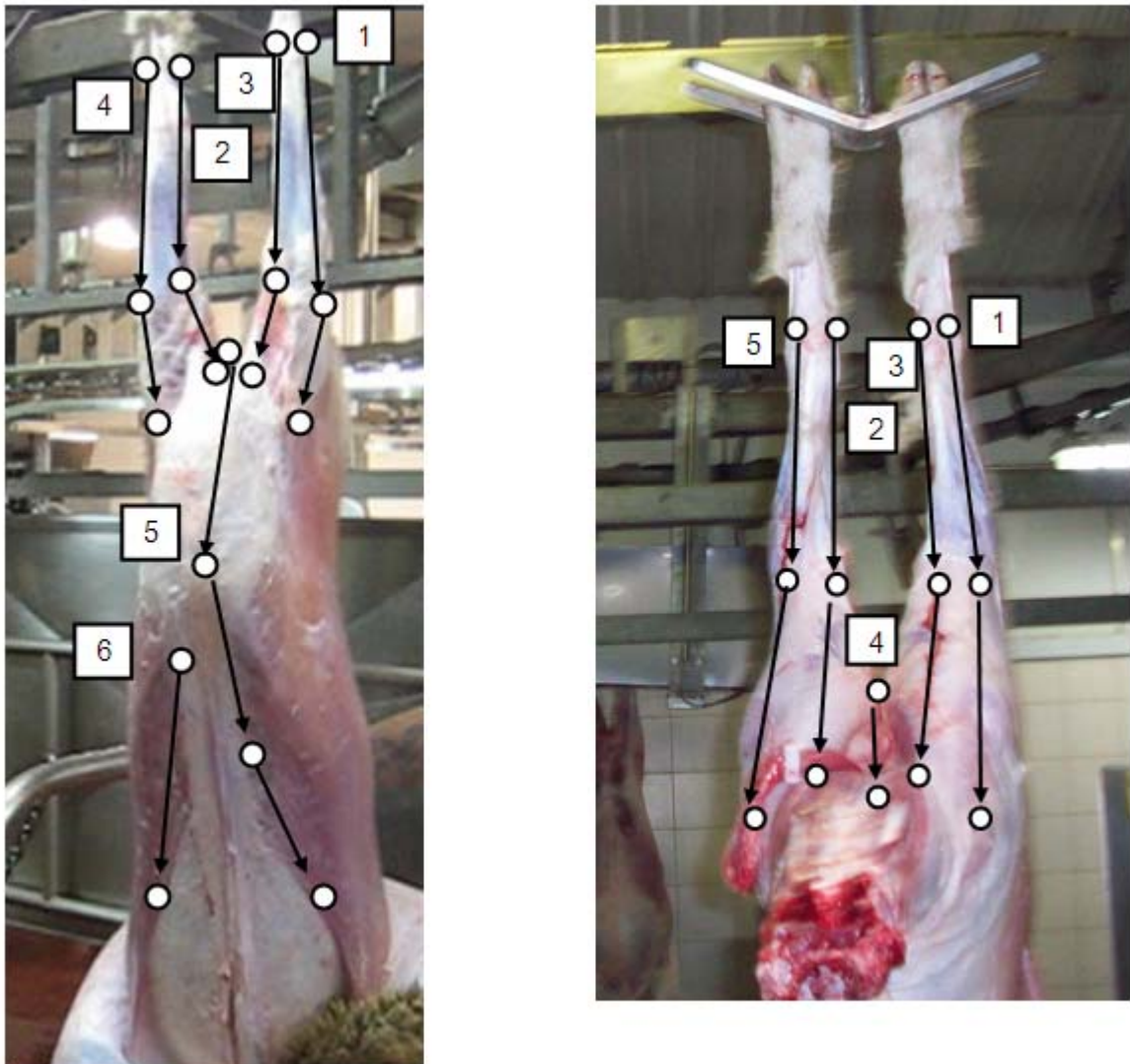


Fig. 1 Proposed Front Forequarter Paths

The Dual Vac San 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 15+ sites are the potential market for this innovation.

2 Project Objectives

- MAR will further develop the robotic dual vac san solution for the industry and satisfy the speed, accuracy, and process criteria's specified by the client
- 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 Dual Vac San 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 Front Sani Vac System was installed and commissioned at Gundagai Meat Processors in Gundagai, NSW between November 2010 and February 2011.

The images below show the installed system:



Fig. 2 Vac San Cell Entry

Following are the main improvements that were made to the system following learning's from the installation of the Front Vac San at Peel Valley as well as installation of the Rear Vac Sans at Peel Valley and Burrangong.

- Tool selection
- Improvements in guarding to avoid cracking
- No hinged platforms for safety mats
- Sensor modifications

3.1 Tool Selection

The tool itself is a new design, and different to the tools used in previous Vac San applications. The wide mouth/opening improves suction and coverage of the tool and manual tests with the tool have proven this.

While previous Vac San tools were made from stainless steel, this tool is made from food grade & chemical resistant plastic. This change in material has reduced the weight of the tool and eliminates some of the robot torque out errors experienced on previous installations.

As with the most recent Front Vac San installation at Castricum Bros, the tool is fitted with a leaf spring arrangement allowing it to comply with different sizes and shapes of carcasses. This differs from the first installation at Peel Valley which used a pneumatic cylinder for this purpose.

The figure below shows a tool installed on one of the VacSan robots at GMP.



Fig. 3 Vac San Tool

3.2 Guarding Improvements

Past installations have used clear Perspex sheets attached to a Stainless Steel frame work to guard the robot cell. Issues have been experienced at Peel Valley that have seen the Perspex crack and splinter as a result of the hot water cleaning and chemicals used. This prompted MAR to move away from the Perspex sheeting and replace this with perforated stainless steel sheets which are capable of standing up to the rigorous abattoir environment. The image below shows the guarding around the cell at GMP, as can be seen the visibility into the cell with this guarding is still very good.



Fig. 3 Cell Perforated guarding installed at GMP

3.3 Safety Platforms & Mats

The Safety Platform selection is a design that has been used in recent abattoir installs by MAR. A Balluff safety mat is fixed to a stainless steel platform and secured around the edges with a stainless steel trim. The platform is then fixed permanently to the floor at an adequate height to enable proper cleaning underneath the platform.

The following figures show the Safety Platforms installed at GMP.

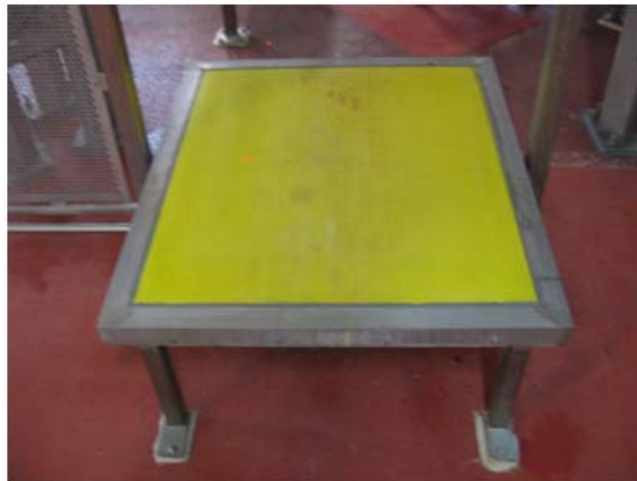


Fig. 4 Entry and exit safety mat platforms at GMP

3.4 Sensing

Due to issues with water ingress into sensors in past abattoir installs, sensors have now been placed inside enclosures 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 also assists in eliminating any erroneous readings that may be experienced due to the water and steam from the vac san tool.

The following figure shows the sensors used (in their enclosures) at GMP.

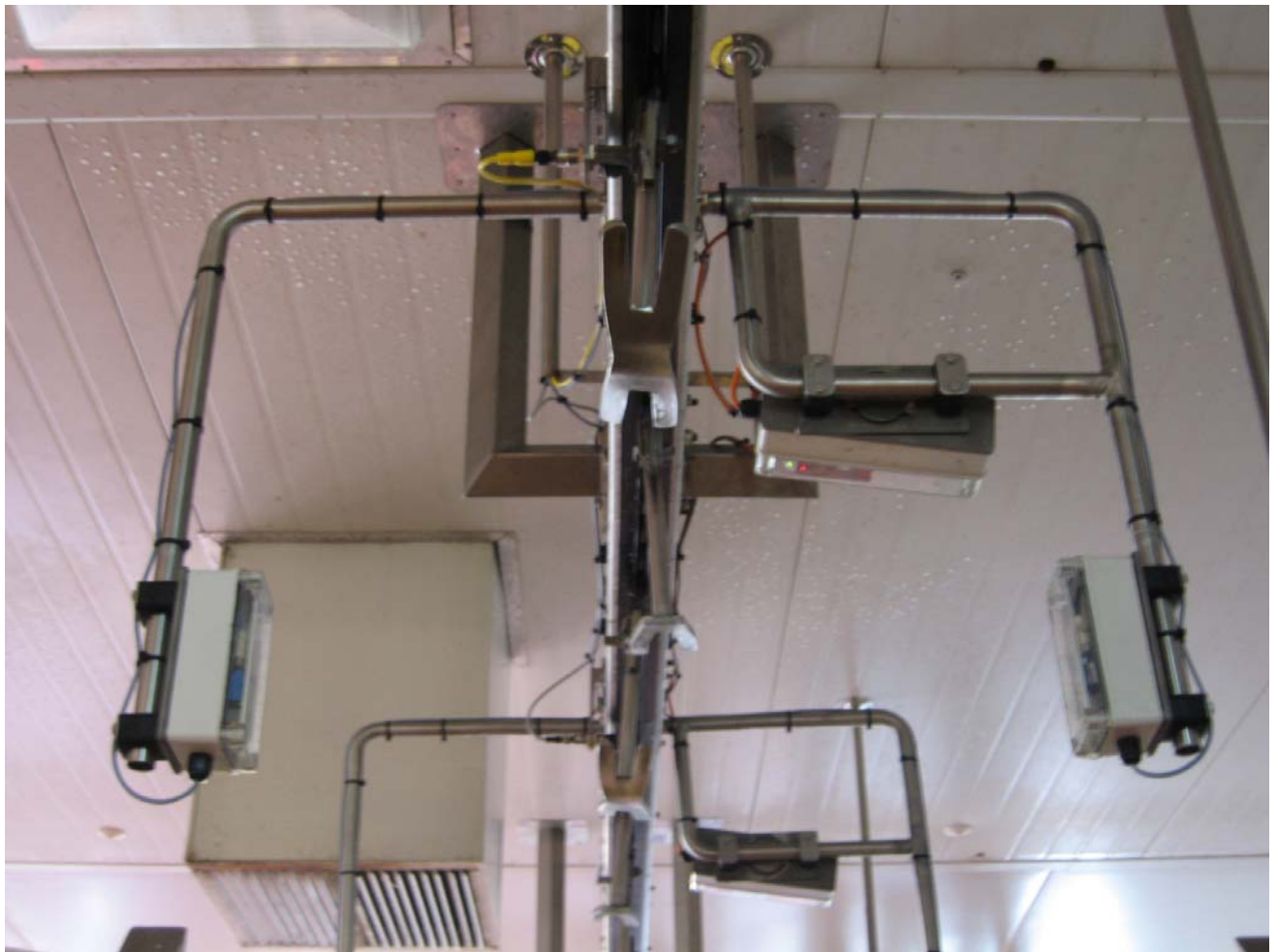


Fig. 5 Sensors mounted at GMP

3.5 Process Paths

To meet customer requirements, the original agreed upon paths were altered. The following pictures show the final paths implemented at GMP.

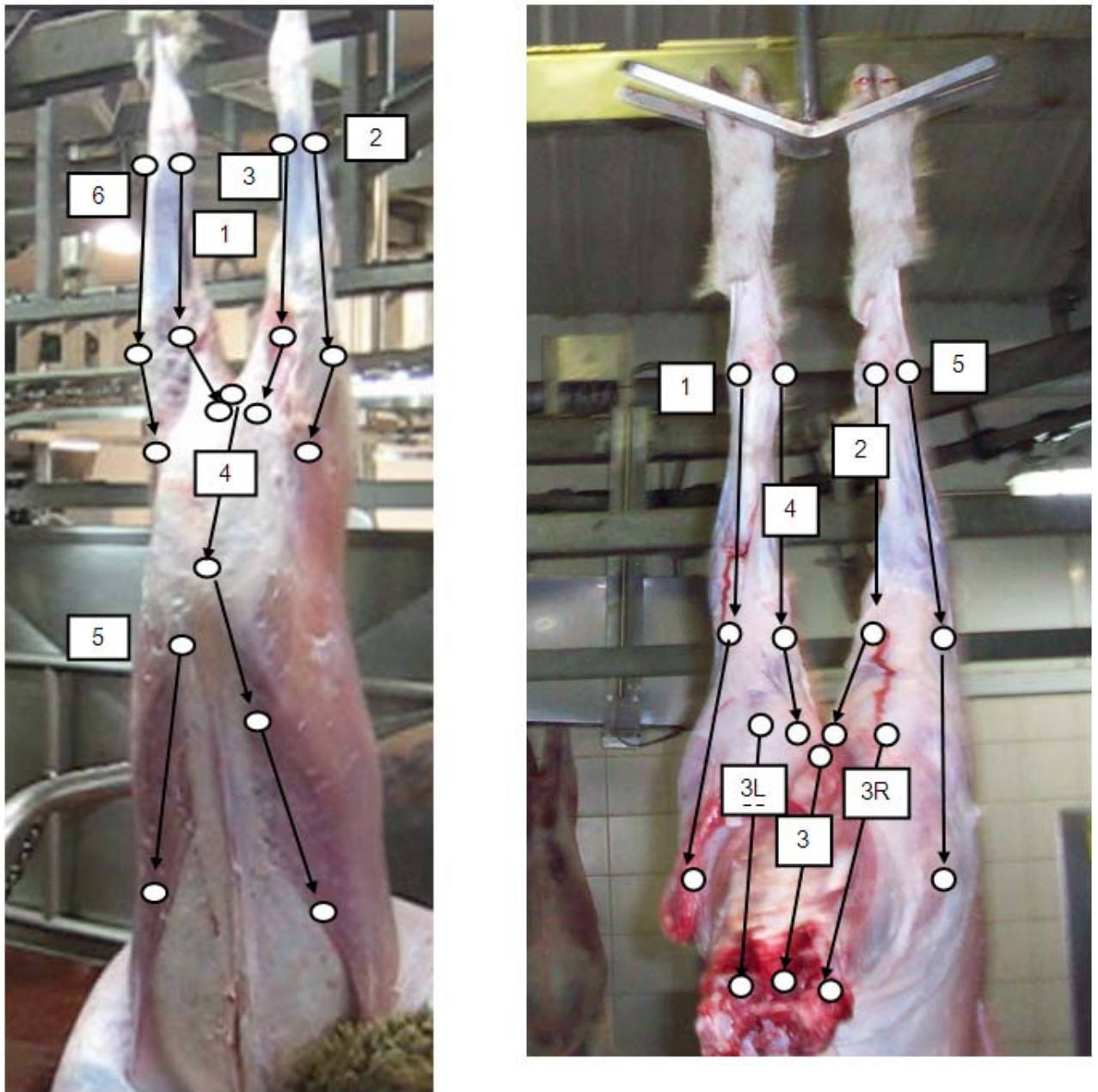


Fig. 5 Final Vac San Paths

4 Success in Achieving Objectives

MAR has successfully achieved the 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 of single VacSans and further developed and improved the Robotic Vac San 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 GMP.
- 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.
- 6) A cycle time of 7.5 carcasses per minute is currently being used

Hence this project has achieved the objectives set out in the initial agreement and GMP have signed off MAR's Site Acceptance Document. MAR is working with GMP post sign off on improving the following items:

- Improvements to Sani Vac tooling to eliminate protein build up
- Modifying the Brisket Saw sterilizing tank to combat excess steam condensation
- Modifying the fencing to eliminate carcass neck rub

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

Benefits to be achieved by utilization and continued development of the Robotic Dual 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 VacSan 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 2 unit of labour per shift.
- Species:
 - The Front Sani Vac 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 Dual Vac San system that has been installed at GMP is a success and MAR would recommend adoption of this system in further plants.