



FINAL REPORT – 2020 1079

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1.0 EXECUTIVE SUMMARY

As part of a wider improvement and upgrade project related to a meat processors Small Stock Slaughter floor, a need was identified to streamline the process of cleaning and delivering gambrels used in its sheep slaughtering process.

The traditional steel gambrel used in its conventional slaughtering process was to be replaced with a plastic gambrel in an inverted process to stay in tune with industry best practice. Investigation was launched into the standard plastic gambrels available in the marketplace along with methodologies of cleaning and delivery to process via its natural recycle from carcass boning operations.

A clear gap in the market was found in terms of cleaning operations with all common practices in use found to be developed to specific sites utilising non standardized materials, bulk handling, and operation.

The change from steel gambrel to plastic gambrel identified many issues amongst which the actual volume taken up by the gambrel in bulk being much larger in the use of plastic gambrels compared to the traditional steel gambrel. Volume difference in the handling of these hooks gave a comparative ratio difference of 1:3 between the two styles of hook, with the plastic hooks taking up as much as 3 times the volume of the traditional gambrel format. Cleaning operations at the meat processing plant was not tenable in its current format to handle these required increased volumes, and an innovative solution had to be found to accommodate the handling of these hooks.

Investigation found that there was no published information available as a solution, and the meat processor commenced an investigation into alternatives, with bulk handling a key objective in its operation. A solution was stumbled upon from the food processing industry where pasta was cooked in a bulk format with a process very similar to the required operation for hook cleaning.

The concept of an automated gambrel washer was further developed in conjunction with an external contractor and a final design approved for manufacture accordingly.

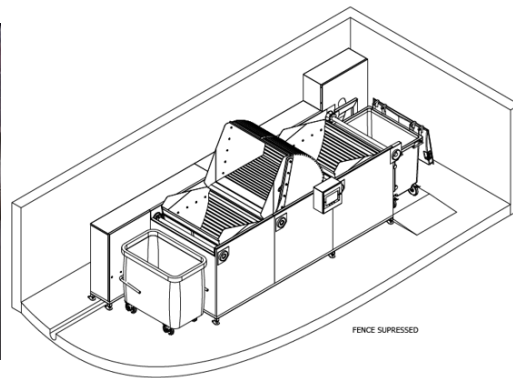
The meat processor has subsequently operated this system with great success since the 26th of September 2020 with the following major outcomes:

- Reduced man hours required to clean hooks.
- Improved operational handling of gambrels in bulk (550 units/batch)
- Improved OH&S outcomes in the cleaning process.
- Improved energy management.

2.0 INTRODUCTION

The objective of this project was to design, build and evaluate a novel concept and method of washing gambrels on an idea loosely built on an industrial pasta cooker. Gambrels were to be washed in an immersion process with stages of wash, rinse and dry combined in a single staged machine.

No publication or broadly used technology was available to satisfy the meat processors requirements and technology was sourced from other industries to combine to an effective solution. The meat processor joined up with a Conveyors and Automation contractor to design and build a replicable solution for industry that satisfied the requirement of bulk handling and automated process to enhance the process of gambrel cleaning and handling.



3.0 PROJECT OBJECTIVES

The Project entailed the design, build and evaluation of a new gambrel washer with targeted reduction in water consumption, energy and labor. This was to be realized by providing:

- A new design hook and gambrel immersion type washing solution for Australian processors to purchase upon successful implementation and
- Proven statistics of reduction in water and energy use.
- Proven reduction in time and labor required for the task.

4. METHODOLOGY

4.1. Design

The first step in design was to establish a receptacle that could hold and transfer gambrels in large enough volumes to accommodate less cycles and movement of bulk handling units. A sample of 700 plastic gambrels was used in order to establish this receptacle, and ultimately a 660L off the shelf waste bin was identified as a unit that would provide a large enough bulk of gambrels. This standard waste bin would hold up to 550 gambrels and still fit through standard single-entry doorways. The approximate weight of this unit filled also allowed for ease of movement steered by a single person.

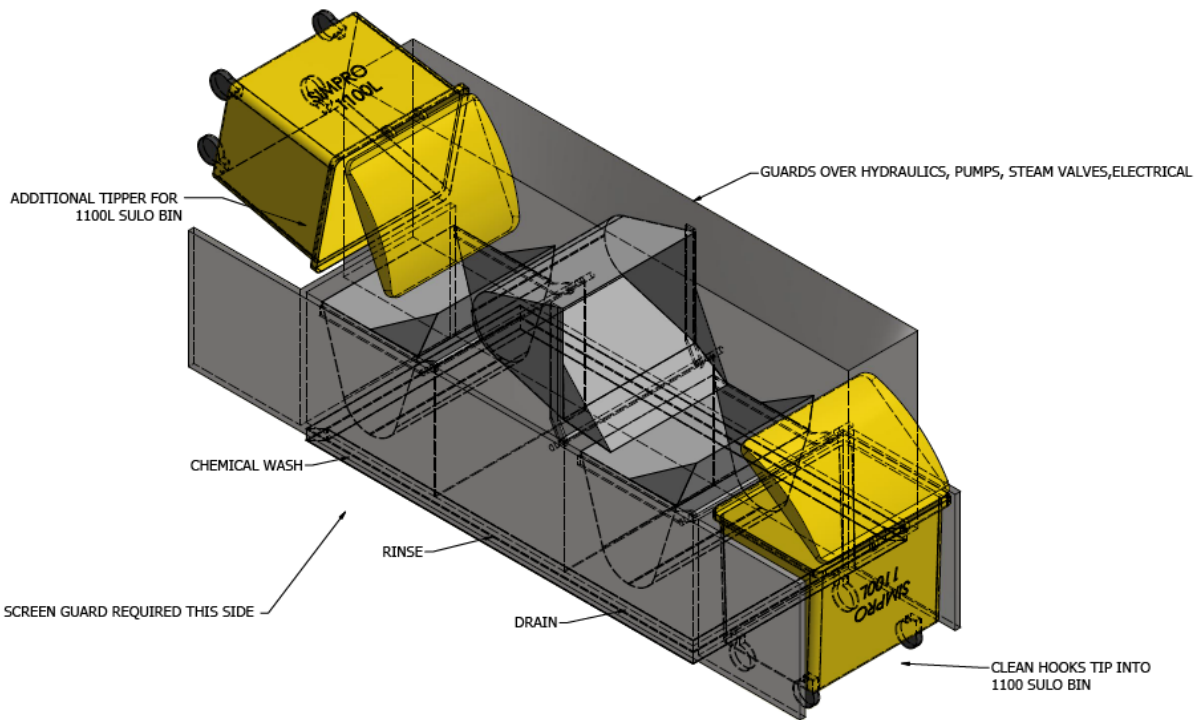
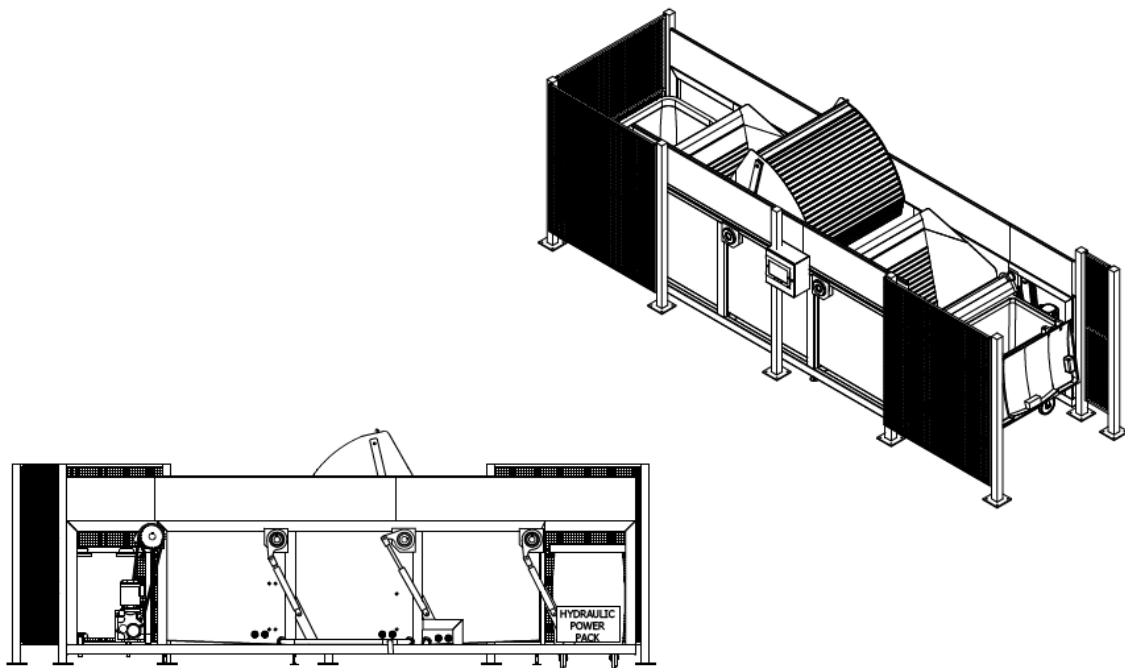


Furthermore, integration with operations and a delivery method to production was identified by using an OEM bin lifter, which would allow direct delivery to the final user on the production floor. The “Megadumper” selected would allow delivery of 550 hooks on demand to the operator on the production floor via remote activation and control once loaded in the lift.



The gambrel washer was then designed around this standard 660L waste bin and incorporated simple and industry standard lifting devices that could be employed in the final design.

The contractor completed design as per the brief, incorporating steam, water and pneumatic control via an integrated PLC.



V&V

4.2 Construction and Testing

The contractor manufactured the entire system at their factory and supplied a complete package to site that only required connection to relevant electrical, water and steam supplies. All Factory acceptance trials were concluded before delivery to site.



5. PROJECT OUTCOMES

5.1 Implementation and Operation

The gambrel washer was delivered and commissioned on site by the designing contractor, in conjunction with sub- contractors that completed supply of service. The unit was tested and fine tuned as part of commissioning with some alterations made in programming to allow for successful “dumping” of hooks into the machine and associated cycles of operation.

The unit was commissioned on schedule with very few teething issues.

The machine allows for multiple batches of gambrels to be cycled through the different stages of washing and can maintain up to 2200 hooks in a single continuous cycle of operation. This has led to significant improvement of time efficiencies in this operation with the human intervention only required to remove filled and emptied tubs as the cycles complete.

The meat processor is able to prepare an entire production day’s gambrels in less than an hour of managed operation of the machine.

The washer is a self-managed unit that has various safety interlocks to mitigate risk to operators.

5.2 Efficiencies

The gambrel washer has realised particular efficiency related to labor hours required to prepare gambrels for production. Conventional operation of dipping hooks in multiple baths manually took an operator up to 6 hours to complete. This washer has cut the requirement of operator attendance by up to 70% and has reduced intensiveness of man-handling dramatically. Generally, the washing process has been cut down to only 2 hours inclusive all bulk handling for delivery to production. The direct labor cost saving is approximately \$27K per annum.

The reduced time required to wash gambrels has also allowed for steam process time to be reduced, and although not defined, it is assumed with confidence to be less than the pre-existing method of operation. Combined with purposely lagged and insulated tanks, and a high buffer volume, energy and water savings are being achieved, although not quantified at this point.

6.0 CONCLUSIONS/RECOMMENDATIONS

Ultimately this project has proven successful, and has shown that cross industry technology is adaptable to suit particular requirements in the meat processing industry.

Sites wishing to progress this solution would have to identify the specific build that suits their operations and bulk handling requirements of gambrels. The technology lends itself to adaptation to different site requirements.

7.0 BIBLIOGRAPHY

None