

Astech PW Bandsaw

Astech PW Bandsaw (Hands Free) Set Weight

Project Code
2021-1125

Prepared by
Bindaree Food Group

Date Submitted
3/1/2023

Published by
AMPC

Date Published
3/1/2023

1 Contents

Contents	2
1.0 Executive Summary	3
2.0 Introduction	3
3.0 Project Objectives	4
4.0 Methodology	4
5.0 Project Outcomes	4
6.0 Discussion	14
7.0 Conclusions / Recommendations	14
8.0 Bibliography	14
9.0 Appendices	15
9.1 Appendix 1	15
9.2 Appendix 2	15

Disclaimer The information contained within this publication has been prepared by a third party commissioned by Australian Meat Processor Corporation Ltd (AMPC). It does not necessarily reflect the opinion or position of AMPC. Care is taken to ensure the accuracy of the information contained in this publication. However, AMPC cannot accept responsibility for the accuracy or completeness of the information or opinions contained in this publication, nor does it endorse or adopt the information contained in this report.

No part of this work may be reproduced, copied, published, communicated or adapted in any form or by any means (electronic or otherwise) without the express written permission of Australian Meat Processor Corporation Ltd. All rights are expressly reserved. Requests for further authorisation should be directed to the Executive Chairman, AMPC, Suite 2, Level 6, 99 Walker Street North Sydney NSW.

1.0 Executive Summary

Bandsaws pose significant risk for injury in the Australian Meat Industry. Although the safety of manual bandsaw equipment has improved greatly (e.g. Bladestop) there remains a potential for injury using equipment with exposed blades. Bindaree Food Group supplies retail and food service industries with portioned and value-added products some of which are produced using bandsaws. This project sought to assess the new hands free Astech PW bandsaw technology that has the added benefit of fixed weight cutting specifically for bone-in products.

An Astech PW bandsaw was purchased from and installed by CBS Foodtech and trials completed to determine operational efficiencies, yields and product specifications. A review of the safety features of the equipment compared with current Bladestop bandsaws already in use onsite was also performed.

The results from this project indicate the Astech PW Saw is efficient and effective at cutting large primals such as Beef shortloins to a fixed weight specification with limited training and skill required of the operators. Limitations of the Astech PW Saw include a maximum primal width of 260mm and slow throughputs, compared to the Astech SR Saw, for smaller primals such as a Lamb shortloin.

The machine is easy to set-up for daily operations and wear and tear similar to traditional bandsaw operations with blades and guides requiring regular replacement. The interface and programmes are also user friendly. The safety features of the Astech PW bandsaw remove the risk of operator amputation or injury compared to Bladestop and traditional manually operated bandsaws. Overall, this equipment is suitable for producing fixed weight bone-in products and is safer to operate than manually operated bandsaws.

2.0 Introduction

In the meat industry, bandsaw machinery poses a significant risk to operators with possibility of amputation and /or serious injury. This risk highlights the need improve OH&S conditions to ameliorate the negative consequences. Smart saw technologies currently exist in the market and have significantly reduced the risk and severity of injury compared with older designs. Although this is a positive outcome the technology still employs traditional manual operator cutting where appendages are still in very close proximity to the blade. High levels of concentration are required by the operator to avoid injury. Bandsaw cutting in this manner is extremely repetitive and after several hours of cutting operators can become fatigued heightening the risk of accident. The Astech PW bandsaw is a technology which significantly distances the operator from the blade by using automation technology. This automatic function also adds capability of fixed weight products which allows for safer and more accurate cutting over an extended period.

Bindaree Food Group, a major contributor to the domestic and export retail markets, has embarked on a project to deliver a safer bandsaw operation that reduces the seriousness and extent of band-saw inflicted injuries. The primary objective is to eliminate the occurrence and risk of amputations and injuries. The Astech PW bandsaw is a major investment into delivering a safer approach into cutting for retail and value adding bone-in meat products.

The purpose of this project is to assess the Astech PW bandsaw in terms of operational efficiency, efficacy and safety in comparison with traditional bandsaw use. The scope of this project covers bone-on products currently produced by Bindaree Food Group as well as new product development and comparisons will be made with both the Bladestop bandsaw and Astech SR bandsaw operations onsite.

3.0 Project Objectives

This project will provide the following outcomes:

- Complete development and facilitated adoption roll-out, and evaluation of the Astech PW bandsaw system for Australian processing conditions.
- Installation, testing and commissioning of new Astech system.
- Develop in-situ system videos, reports and documentation detailing outcomes at the plant after production trials have been completed will be provided for industry dissemination and promotional purposes
- New Data collected from operators, detailing speed accuracy and confidence, will be published to industry.

4.0 Methodology

An Astech PW bandsaw was purchased from and installed by CBS Foodtech at Bindaree Food Group's further processing site, Bindaree Food Solutions (BFS), located on the Gold Coast, Queensland. Several trials conducted assessed the overall capability and throughput of the Astech PW bandsaw as well as its safety features. The machine can cut to a fixed weight or thickness depending on the desired specification. As a bandsaw, it is ideal for cutting pre-crusted bone-in primal cuts as well as various bones. Several different beef and lamb primal cuts were trialled and assessed accordingly. Considerations about the nature of each primal as well as a feasible retail offering were made when conducting trials.

For each assessment:

1. Initial primal weights recorded before processing.
2. After processing, finished product was assessed to determine quality and specification.
3. Output quantities for in-spec and out-of-spec were recorded and used to determine yields.
4. Processing time assessed.
5. Where possible, steps 1-4 repeated using manual Blade stop bandsaw for processing comparison.

An assessment of the safety aspects of the Astech PW bandsaw was completed whereby operators were interviewed regarding their thoughts on the bandsaw equipment used onsite from a safety and operational perspective.

5.0 Project Outcomes

5.1 Astech PW Bandsaw Installation, Commissioning and Maintenance

The Astech PW bandsaw (Image 1) was installed and commissioned by CBS Foodtech and training given to operational and maintenance teams. The saw was situated in a separate processing room for trials as to not interrupt daily processing requirements.

Image 1. Astech PW bandsaw commissioned at BFS



The Astech PW bandsaw requires power, water and air for operation and a network connection is useful for remote assistance from CBS technicians. During commissioning there were a couple of issues with faulty proximity sensors which may have been caused by water ingress during cleaning. These sensors were replaced immediately by CBS Foodtech and there have been no further sensor issues. Product specifications were shared with the CBS technician and appropriate programmes set-up and tested. The machine has a user-friendly interface (Images 2, 3 and 4) and the accompanying manual assists greatly with programme set-up.

Image 2. User interface touch screen



Image 3. User interface touch screen programme set-up

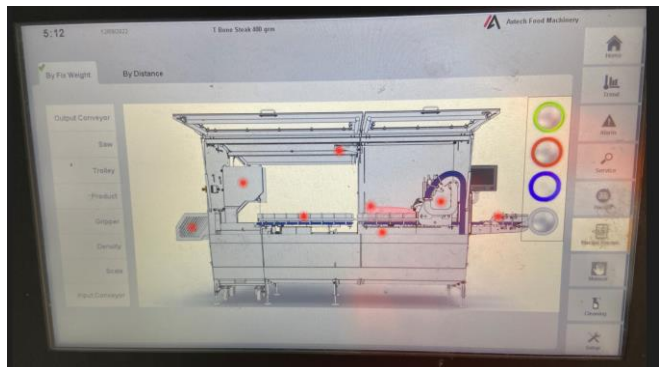
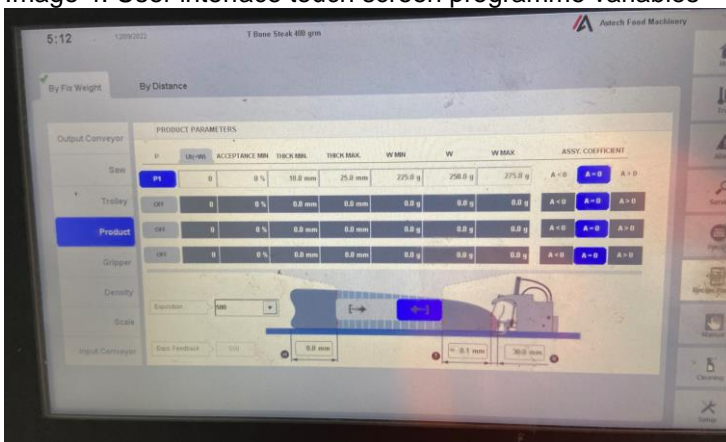


Image 4. User interface touch screen programme variables

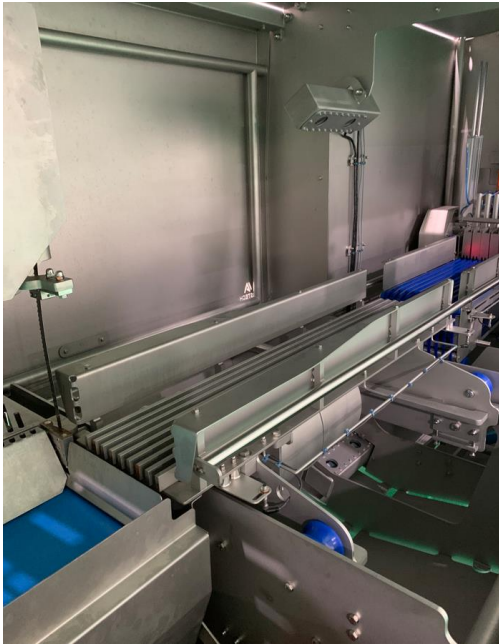


The daily clean down and set-up of the machine requires removal of belts and the bandsaw blade. The side panels lift (Image 5) and componentry easily accessible for cleaning purposes (Image 6).

Image 5. Side panels lift on hydraulics for easy access



Image 6. Internal components requiring cleaning.

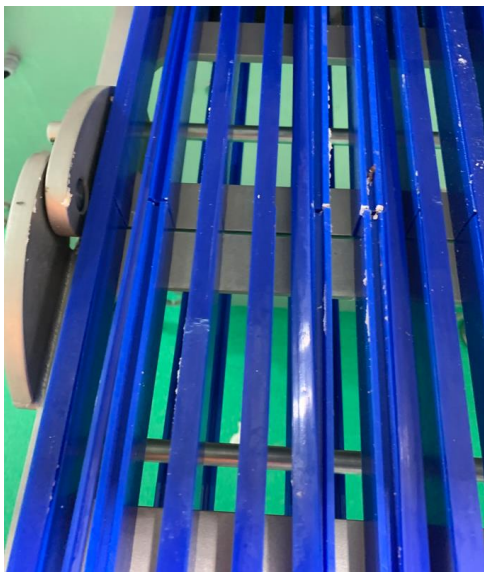


General wear and tear has been minimal as the machine has only been used for trials and production contingency for lamb loin and forequarter products on a couple of occasions. Only replaceable parts have needed attention such as replacement of the bandsaw blade and some minimal friction wear on the blade guides (Image 7) both of which are typical of any bandsaw use. The infeed belt (Image 8) consists of eight thin sections that sit on plastic guides. During trials these belts were found to stray from the guides easily, especially during primal loading. There were signs of wear and tear on these and based on the usage of the machine it is expected that during heavier production schedules these may need replacing on a more regular basis.

Image 7. Bandsaw blade guides need replacing regularly



Image 8. Infeed belts stray from guides and may need regular replacement.



5.2 Cutting Assessment

Apart from initial programme set-up testing, further validation and new product development trials were completed. Product specification, yield and throughput data from these trials is shared accordingly. Products tested included Beef sternum and Brisket bones, Beef shortloins, Beef Shell loins and Lamb shortloins.

5.2.1 Beef Brisket and Sternum Bones

Full Beef brisket and sternum bones were assessed through the Astech PW bandsaw and the Bladestop bandsaw. The primals were cut to a 40mm thickness. Table 1 presents the yield and throughput data for the trial. As per images 9 and 10, the Astech PW Bandsaw produced a more consistent cut compared to the bones cut manually on the Bladestop bandsaw.

Table 1. Beef sternum and bone yield and throughput data.

	Sternum Bone		Brisket bone	
	Astech PW-saw (auto)	Blade stop (manual)	Astech PW-saw (auto)	Blade stop (manual)
Input Total weight (kg)	16.2	17.9	10	17.3
Output weight (kg)	14.58	10.74	9	10
Yield (%)	90	60	90	58
Time (s)	170	156	140	168
Input (kg/h)	343	413	257	371
Output (kg/h)	309	248	231	214

Image 9. Astech PW bandsaw (Automatic) Cut Bones



Image 10. Bladestop (Manual) cut Bones – note the sharp edges and misshapen appearance



5.2.2 Beef T-bones

Beef shortloins were cut on a 1kg fixed weight programme through the Astech PW bandsaw. Yield, throughput and steak weight data was assessed. Once face cuts (ranging from 300g to 700g) were removed from the data-set the resulting steak weight variance was minimal. Due to the large primal weights the throughput rate on the Astech PW bandsaw was deemed acceptable. Appendix 1. Presents a video of the Astech PW bandsaw cutting 1kg fixed weight T-bone steaks from a Beef shortloin.

Table 2. T-bone yield and throughput rates on Astech PW bandsaw

	Astech PW-saw (auto)
Input Total weight (kg)	41
Yield (%)	84.7
Time (s for 10kg primal)	60
Throughput (kg/h)	600
Mean Steak weight (g)	989
Std Dev Steak Weight (g)	192
Mean Steak weight post face cut removal (g)	1074
Std Dev Steak Weight post face cut removal (g)	48

5.2.3 Beef Club Steaks

Beef Shell loins were cut on the 250g fixed weight and 22mm thickness programmes. Gripper end portions required further cutting on the Bladestop bandsaw to the required thickness and/or weight. Club steaks required some subcutaneous fat trimming post cutting which needs to be taken into consideration when setting fixed weight programmes. Image 11 shows a 5kg shell loin cut using the 250g fixed weight programme. All steaks were 20mm thick. Image 12 shows a 7kg shell loin cut using the 250g fixed weight programme. All steaks were 15mm thick.

Image 13 shows the limitations of the input belt for large primals. This shell loin required trimming of the tail to be able to physically enter the Astech PW bandsaw. The maximum width of the input belt is 260mm.

Table 3. Beef Club Steak yield and throughput summary (PW Astech Bandsaw)

	22mm setting	250g FW setting
Input Total weight (kg)	14.7	28.6
Yield (%)	91%	87%
Thickness range (mm)	22mm	13mm-20mm
Mean Steak weight (g)	415	261
Std Dev Steak Weight after face cut and gripper portion removal (g)	39	6.9
Time (s)	74	130
Throughput (kg/h)	105	75

Image 11. 5kg Shell loin cut on 250g fixed weight programme resulting in 20mm thick club steaks



Image 12. 7kg Shell loin cut on 250g fixed weight programme resulting in 15mm thick club steaks



Image 13. The input belt width is 260mm wide.



5.2.4 Lamb Loin Chops

Lamb shortloin primals were processed through the Astech PW bandsaw using a fixed weight setting. Table 4 presents the data from this trial. Each primal was weighed before cutting. After processing the portions and trim were quantified to calculate yield (%). The time(s) was measured for each primal from when the operator put raw material on the belt to when the last portion fell into the tub after cutting. Operating errors and variabilities were also observed and have been considered. The last portion held by the grippers needed to be manually trimmed with a Bladestop bandsaw. Although these primals were cut on a fixed weight setting to assess steak weight variability, throughput rates of the Astech PW bandsaw have been compared with the currently used Astech SR saw that can cut 5-6 Lamb shortloin primals to a thickness spec at one time.

Appendix 2 presents a video showing the cutting of a Lamb shortloin through the Astech PW bandsaw.

Table 4. Lamb shortloin yield and throughput

Lamb Loin Chops	Astech PW-saw (auto)
Input Total weight (kg)	11.65
Yield (%)	82
Time (s / 1kg primal)	30
Throughput (kg/h)	120
Mean Steak weight (g)	126.5
Std Dev Steak Weight (g)	13.5

5.3 Occupational Health and Safety

5.3.1 Bandsaw Injuries

BFS use a Bladestop bandsaw and only one injury has been sustained during the use of it since its installation 18 months ago.

There have been no injuries sustained during the operation of the Astech SR Bandsaw (Image 14) since it was installed 2.5 years ago. Risk mitigation of the operation of this equipment regarding hazardous manual tasks includes rotation of loading operators and ensuring operators can load from below shoulder height.



Image 14. Astech SR bandsaw also in operation at Bindaree Food Solutions

5.3.2 Bandsaw Safety Review and Operator Feedback

Bindaree Food Group performed an OH&S Bandsaw review whereby operators were asked for feedback on their knowledge and thoughts on bandsaw operation at BFS.

The following feedback relates to the Bladestop bandsaw:

The interviewer noted from the review that the use of the Bladestop bandsaw requires thorough understanding of start-up checks and the need to stay focussed, avoid distractions and stop work if they feel tired.

- “The cord is attached to my body, which I cannot disconnect myself from when I need to refill the green tub with meat. If I disconnect it, I need to go through all the sensor checks again, and that takes time. The s-tub with the raw material stays outside the barrier. The cord is not long enough.”
- “The room is very cold; the table gets sticky with fat and makes harder to slide meat.”
- “Being isolated from rest of production, I find it hard mentally when working on the saw all day.”
- “People are coming into the band saw area without having the right PPE on / not wearing blue gloves”
- “Even though the machines are failsafe, you can still get hurt”

The following feedback related to the use of the Astech PW bandsaw:

- “very safe piece of equipment”.
- “Good PPE that is not too big like the ones I have now.”
- “Easy to use, I feel safe”
- “It’s not as fast as the other bandsaw but it’s much safer”
- “I don’t need the same lighting to operate the machine compared to the manual one”
- “I like knowing that I’m not going to hurt myself if I get tired or distracted”

During the trials on the Astech PW bandsaw there were no concerns raised or incidents regarding the safety and operation of the machine. The outfeed conveyor consists of an extensive guard (Image 15) that restricts access to internal conveyors and the bandsaw blade. Sensors ensure all safety measures are in place prior to operation. A sensor gate at the infeed belt also restricts access and potential for injury (Image 16).

Image 15. Outfeed belt guard



Image 16. Infeed belt sensor gate



6.0 Discussion

The Astech PW bandsaw is designed to reduce the risk of injury and as such the training requirements for operators minimal in comparison to traditional bandsaws. Operators are required to load the infeed belt and understand the basic operational functions such as changing the programme and start/stop buttons. The ease of access to the internal belts and consumables meant the BFS cleaning crew had very few issues with daily cleaning operations.

The Astech PW bandsaw throughput was slow for small primals due to only one primal able to be loaded at a time. Belt and cutting speeds of the Astech PW Bandsaw can be adjusted and therefore throughputs potentially improved compared to those detailed during trials. Primal size also affects throughput with satisfactory rates achieved for large Beef primals such as Beef shortloins.

The fixed weight yields and steak weight variance obtained during the trials were found to be acceptable. Further production data with primals of varying size and weight will help validate this data.

A challenge with automated bandsaws is minimising the waste of the gripper piece reducing yield loss and/or the need to cut the gripper portion further manually on a Bladestop bandsaw. Adjustments to the programme can assist with minimising any loss however with fixed weight product the resulting portions may not suit the required specification.

The safety features of the Astech PW bandsaw were apparent and readily accepted by current Bladestop bandsaw operators at BFS.

From the operator feedback the overall safety benefits of the PW saw can be summarised as per the below:

- Due to the operation requiring less skill, the operator training is less intensive. It also allows more operators to be trained and therefore operator rotation on the job.
- Tiredness and distractions are not a threat to operator safety as the blade is encased inside the machine.
- Non-operator safety is not an issue due to the encased blade.
- The operator has the freedom to move and collect raw material during bandsaw operation.
- The operator is not required to wear extensive PPE to operate the machine

7.0 Conclusions / Recommendations

The Astech PW Bandsaw is an effective and safe option for the cutting of fixed weight bone in meat primals and would be suitable for further processing operations. Further production size trials would validate the data collected in this project however BFS has not yet found a suitable market for fixed weight bone-in products.

8.0 Bibliography

Nil

9.0 Appendices

9.1 Appendix 1

Video: Beef Shortloin

9.2 Appendix 2

Video: Lamb Shortloin