

final report

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Sociotechnical design of meat packing room at Harvey Beef

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Executive summary

In 2003/04, Harvey Beef, then owned by E.G. Green reviewed the design of their packoff room with a view to improving the layout due to excessive double handling, high levels of dropped meat and unacceptable medical treatment injuries. A PIP was drawn up with MLA covering the “sociotechnical” redesign of the packing room and in November 2006, MLA signed an agreement to part fund the installation.

Equipment was designed, fabricated and installed by Machinery Developments Ltd to handle the cuts of meat which are Cryovaced, now comprising 80% of production. Some of the equipment had not been operated in a fully commercial role in Australia before. This installed equipment comprised of two touch screens where an operator identifies the cut, two units which laser size and weigh cuts, two Multiloaders where the cuts are bagged, a six and a four Multibagger which produces a correct length bag of one of three widths printed with cut identification and weight, and a Carousel packoff belt.

This report is the independent review of the objectives and outcomes described in the agreement which was to be done as part of the contract with MLA once the equipment had been commissioned.

Many of the comparisons between the old and new packoff rooms listed in the agreement cannot be made because all the numerical and most of the descriptive documentation of the old system was lost when the company changed hands.

Interviews were held with personnel from the various departments of the companies operation and the equipment suppliers to judge before and after performance. This was difficult as most of the personnel have changed including the MLA representative.

Little of the numerical data due to be documented under the agreement, was available, anecdotal evidence is that it was not recorded. However, it is clear that the new system results in less double handling, lower levels of dropped meat and fewer medical treatment injuries of lower cost to the company.

The technology is conceptually a good idea. However, it is complicated, complex, highly technical and appears not to be robust. It needs regular skilled maintenance in order to fully function. It is difficult to keep clean. It is capable of weighing all cuts, and printing cut identity and weight on a correctly sized bag. It has been recognised by the designers as in need of improvement. This improved design has had all known troublesome items eliminated. It would appear that the Multiloader which saves packers lifting cuts into the bag, may not form part of the new design as there is inherently a problem with the concept.

The Carousel is a success. It operates trouble free. It removes the need for double handling and allows easy cut identification and packoff with minimal manual handling of bagged cuts with the opportunity to verify correct cut identification in an unhurried atmosphere.

There has been no reduction in labour but a reduction is possible if all meat cuts were directed to fully functional equipment.

Great emphasis had been placed on using a “sociotechnical” approach to the new installation compared to just installing the new equipment and training personnel to use it. There was no evidence amongst the operators that this has resulted in more ownership by them of the new design or that any remember being consulted. However, photographic evidence shows the

Carousel was the only equipment about which operators appeared to have been consulted, and the operators all declared it a success.

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1 Introduction

In 2003/04, Harvey Beef reviewed the design of their packoff room with a view to improving the layout due to excessive double handling, high levels of dropped meat and unacceptable medical treatment injuries. Part of the MLA summer vacation project completed by Daniel Low that year was the review of various layouts. He recorded the 2003/04 layout, fig 1 and the proposed design, fig 2.

At that time the company was E.G. Green and the Chief Engineer was Gordon Henderson. The design shown in fig 2 was further developed into the FINAL design, shown in fig 3 (taken from a PowerPoint presentation by Michelle Chatfield). There have been some minor modifications since, particularly replacing the second hand 5 chamber Cryovac with a new 6 chamber unit in June 2008.

This report covers only the changes made to the handling of the cuts of meat that are sent to the Cryovac units. The IW product going to the freezer, the trim, the fat and the bones are not the subject of this report. At various times since 2003 there have been many discussions and proposals to send IW product through one of the two Cryovacs and to having up to four belts to separately transport primals, trim, fat, and bone.

The “old” packing area was installed in 1995 together with the 3 chamber Cryovac. From July 2003 until August 2006, there were extensive discussions regarding the packing area redesign and a PIP was drawn up with MLA covering the “sociotechnical” redesign of the packing room. In November 2006, MLA signed a contract to part fund the installation under an agreement, Appendix B.

2 Main

2.1 Original meat packaging room operation

The old packing room system was as follows.

The cuts of meat travelled down a conveyor and were picked off the belt by a team of packers into perhaps 16 different cartons. Each cut had to be lifted into a plastic bag and then placed into the appropriate carton. The cuts that were not picked off ended up on a conical shaped Lazy Susan. These cuts were taken off and trolleyed back to the start of the belt again. At times the Lazy Susan was overloaded and cuts fell on the floor. When the packers filled a box, they lifted the box, twisted around and put the full 27kg carton on to another conveyor. This system resulted in excess double handling, excessive dropped product, high strain injuries and errors in packaging the correct cuts of meat. About 30 packers packed meat from 450 head per day generally operating 2 x 9hr shifts 5 days per week. In 1995, about 20% of the meat went to Cryovac and 80% to IW.

The above description does not exactly agree with that described in the student vacation report written by Daniel Low in Feb 2004 which included some photographs. This report states that the cuts of meat travelled down a sorting conveyor where the primals were taken off from one side, put into a standard length bag which had been collected from above the Cryovac conveyor behind the packer and then the packer again turned 180° carrying the bagged cut and placed it on the Cryovac conveyor. Cuts that were not picked off, ended up in a tray at the end of the conveyor. Trim was picked off the opposite side of the sorting conveyor. At intervals, the meat was taken out of the end tray and returned to the start of the sorting conveyor. The Lazy Susan was after the Cryovac shrink tunnel and collected cuts that had not been taken off the packoff conveyor and put into the correct carton. The end tray, Lazy Susan and sorting conveyor/Cryovac conveyor photographs are in Appendix A. This report also identified that there were 29 operators used and that the plan was to reduce this to 13 under the new “sociotechnical” designed system.

2.2 The new packing room operation

A freezer unit was removed and the new pack off area was designed to be installed at right angles to the old system. The old system was removed very recently so could not be examined for the writing of this report. The new system, Fig 3 consisted of the following

- two CutLink units each of which has a Laser measurer then a Scale and then a Multiloader. The unit automatically sizes the cut which has been pre identified by a packer using a touch screen. The cut is automatically weighed, and the Multiloader delivers the cut to the packer on a slide mechanism.
- two Multibaggers that produce the correct length bag in one of three widths correctly labelled with cut identification and weight printed on the bag which the packer then slides over the meat helped by metal fingers. The Multiloader table on which the cut of meat rests then spins 180° on the axis of travel to deposit the bagged meat on to a conveyor. CutLink No.1 unit is supplied with bags from a 6 bag Multibagger while CutLink No.2 is supplied with a 4 bag Multibagger.

- The conveyor from No.1 CutLink unit transports the cut to the 6 chamber Cryovac, while the conveyor from No.2 feeds the older 3 chamber Cryovac.
- Both Cryovacs feed one Shrink tunnel and then feed a Carousel.
- The Carousel conveyor belt is raised at one end above head height so personnel can access the centre. One third to one half of the Carousel tilts upwards. On the outside of the horizontal section there are 14 bays each of which consist of a buffer area for the cuts to be stored and a table for a carton. An empty carton conveyor is situated directly above the Carousel and immediately below the Carousel is a conveyor which takes the full cartons to the metal detector followed by the chiller. One person is located inside the Carousel to identify the cut and move it into the appropriate buffer while three packers are located outside the Carousel to take the bagged cut of meat from the buffer and put it into one of the (up to)14 cartons. The packers write the cut code on the outside of the carton as in the old system.

Photographs showing the old and new bagging and cartoning systems are shown in Appendix H.

2.3 Performance against R&D project agreement

To assess the operations of the “old” pack off room and the “new” pack off room and how this conformed to the MLA/HIG contract, a number of people were interviewed who represented the views of the packers, the team leaders, the supervisors, the office staff, the maintenance personnel, the equipment suppliers and management. The list of people interviewed is shown in Appendix C.

Between the operation of the “old” and “new” systems, most of the packers have left, the majority of team leaders were available though some have changed jobs, the two shift supervisors were still available though the shift system has changed, the chief engineer and project manager have left, but the office staff were mostly the same though the chief operations officer and CEO were different. Also, the original company had been put into the hands of administrators and ownership had changed, so all operational documents representing the old system had been removed, though some information was still available from individual computers.

The Objectives and Outcomes sub headings written into the Agreement P.PSH.0236, are shown in Appendix B. As the deliverables under the agreement are spread between the sub headings objectives and outcomes, each separate statement in each of the two sub headings are addressed in the order they are written in the Agreement. The significant wording from the Agreement is in bold and inverted commas.

2.3.1 Objectives

1 The **“first step in the process”** was for MLA and HIG to work together to develop and document a clear innovation/business strategy. This was not done first, it was produced in Draft form in November 2007, Appendix C after meetings between MLA and HIG.

2 The second step was **“benchmarking and evaluating economic costing of labour and retention undertaken and benefit of sociotechnical design”**. While the meaning of the underlined statement is unclear, there are no documents available from the time the pack off room was operated under the original system, so no data is available for benchmarking, or costing.

This project **“presents an opportunity for a specific industry tool to be developed and tested”** on the **“true cost of turnover”**. The contract does not say whether this tool was to be

developed by MLA or Harvey, and tested by MLA or Harvey. There was no evidence found that a tool had been developed or tested.

The **“benchmarking and measurement throughout the project will highlight and measure the benefits of utilising the sociotechnical design”**. There was no evidence that this was done.

3 “Technical design and implementation of workplace changes.”

- **“Installation of cut link technology to identify, weigh and label product during packaging process.”**

Initially, when the equipment was installed, all the hoses had to be replaced. Some people at Harvey thought this was because the units had been in storage for a long time but Machinery Developments Ltd claim it was because of the type of detergent used for factory clean down not being compatible. This was the first CutLink installation in which a client had asked for the fitting of cleaning nozzles. Harvey personnel say the design is not waterproof and it is inherently difficult to clean because it is not hygienically designed. These cleaning problems were said to be not present at the other two places in the world where the CutLink units operated commercially for a number of years.

There have been six Multiloaders built and operated in the world. The first two were at Rockdale where they were first developed and where three people from Harvey visited to see them in operation. The Harvey people claim they were not in operation on the main flow of meat during the visit. Two more, of an improved design were sold to Argentina with the driving force being traceability. They were removed a few years later after the need for traceability was removed. Two of a slightly further improved design were then made for Harvey.

Soon after the Harvey units were installed, both gearboxes were replaced. The linear motors regularly have caused trouble. The units are not moisture proof and there is rusting evident. A number of aluminium parts originally used in the equipment were replaced by stainless steel. Harvey say the units need a 20 hr service every weekend. Cuts regularly fall off the Multiloader slide in the bagging area. They used to fall on the ground but Harvey have now installed stainless steel trays underneath which stop the cuts hitting the floor. The trays can be sanitised so now the cuts can be recovered. Five cuts fell during a one hour observation. There is a stainless steel hook tool placed there in readiness to recover cuts

The fingers or forks which are used to hold open the bag have been removed as they were slowing the operation of bagging the cuts.

Machinery Developments Ltd said the CutLink design installed at Harvey has been superseded by a newer more robust design with all the faults in the previous system having been designed out. However, they may never build another Multiloader as it has proved to be the least reliable part of the system though they may have a design in which 2 sets of fingers present the meat for bagging. They say the main problem with the Multiloader is that if it breaks down it cannot be bypassed. This is possibly not the case as the conveyor from the laser sizing could perhaps be arranged to rotate down and deliver the cut to the conveyor which presently receives the bagged cut. It could then rise to the operator level again on the far side of the Multibagger. The operator could then bag the cut immediately after the Multibagger rather than just before it.

The Cut link technology does not identify cuts. An operator identifies the cuts and punches in the information on a touch screen. The CutLink technology measures the dimensions of the cut so that the correct bag width and length is produced by the Multibagger.

In recent times, and during the four day site visit, the weighing scales on both lines had been inactivated as they were causing so many stoppages. The scales are particularly important for those cuts that are weight ranged ie 4 to 6 of the 14 to 16 cuts, as these cuts are packed in different cartons according to size. There is no point in the scales being fixed if the information is not printed on the bag. When the scales and printer are not operational, the cuts that need to be weight ranged are weighed manually by the operator who identifies the cut at the Carousel. Various reasons were given as to why neither scale was working. *"They weigh differently depending on whether the weight is put in the centre or in a corner". "They do not meet the Australian Standard."* *"They get fouled by fat/meat due to close tolerances."* *"They are obsolete units". "Load cell technology only works with stationary loads."* *"No maintenance people know how to maintain them"*. Machinery Developments Ltd claim the scales are standard off the shelf scales that meet all Standards and that they operated for many years in Tey's Bros. One difference, according to Machinery Developments, was that belt and scale washing is used at Harvey. However, scales and conveyor belting must be washable for operation in a meat packing room. Part of the potential advantage of a sophisticated system which weighs each cut that has been identified at the touch screen stage is that yield of each primal can be linked back eventually to carcass. If this is not required then it is an unwarranted expense as overall yield can be obtained by weighing cartons, there is no need to weigh every cut if only a small percentage need to be weighed for weight range packaging and the end customer will always weigh each cut before sale.

Machinery Developments Ltd set up a special website for Harvey people to access all software and hardware manuals and all wiring diagrams plus a private blog site to report problems and seek solutions, (see Appendix D). This site was investigated. There were no queries on that site regarding the scales. It was said at Harvey that there was difficulty fixing things due to lack of documentation yet this website appears to contain all the documentation. If documentation is missing then a request in the blog should produce the required item. In the 18 months since installation, there have only been 2 software requests for assistance (by Brian T), and none since Oct 2007, and 3 hardware requests for assistance (by Todd and Jason), and none since June 2008.

Labelling has been inactivated recently because of unidentified problems possible thought by maintenance to be software related. The printers have been the cause of many breakdowns. There are 10 printers, one for each bag. Thermal Coding Australia claim there are over 800 printers operating trouble free in Australia at present, including many in abattoirs eg 8 at Tatiara. There is no evidence of any printer problem being recorded on the blog or a request for advice. Two printers were returned to TCA for repair in April 2008. TCA said that the printers should need only annual maintenance however, there are many variables including air pressure, temperature, humidity that can affect the printing but it is not usually the electronics. TCA have a representative in Perth if the labelling needs to be fixed.

Machinery Developments Ltd offered to maintain their units under a 4 x \$6,000/yr contract, though it is unclear what other costs there may be for spares and site visits. This was not acceptable to Harvey.

- **"Simplification of cut identification and error proofing during primal/sub primal cut identification"**. The operators are happy with the new system, in that they have time to identify a cut and correct mistakes. When the equipment is fully functional, a dedicated operator identifies the cut on the touch screen then it is then checked a second time by the operator who works inside the Carousel and who moves the cut into the appropriate buffer. There is another check on this decision as a packer then puts the cut in the carton and can verify it is correct. Even without the touch screen operator, there is verification that the cut has been identified

correctly. This would appear to error proof identification compared to the old system of a packer just picking a cut off a conveyor and putting it into the carton.

- **“Development of automated bagging equipment which increases packaging capacity to 40 cuts per minute”.**

To operate at 40 cuts per min the plant would possibly be processing 580 head per day which is well above the present plant throughput needs. The opinion of the experienced shift supervisors is that the CutLink system could operate at a maximum of 15 cuts per min on each line with a consistent output of 12 cuts per min on each line. The new 6 chamber Cryovac is rated at 35 cuts per minute but is generally processing 24 cuts per min maximum.

- **“Design and development of an accumulating sorting and storage area for individual wrapped cuts”.**

Prior to final fabrication and design layout, a number of packers were given the opportunity to visit a wooden mockup of the packoff and buffer area to pass comment on the design, (see Appendix E). None of the people interviewed for this report said they knew of this opportunity but clearly the photographs show some people trialling the mockups. The concept of the oval shaped Carousel began in 2003/04 but initially there was concern that no hygienic belt was available commercially which would turn on such a small radius. The belt is raised at one end above head height which allows the operator(s) in the centre to easily exit without having need for hinged sections on the conveyor. This is a good safety point. There was comment that bone-in product in Cryovac bags can suffer damage on transfer between flat and raised belt sections, particularly if the bags go around a few times before pack off. However, this could not be verified by any data.

All of the packers, team leaders and supervisors thought the Carousel part of the installation very successful. There are 14 positions around the Carousel for cartons, with 3 operators packing and one in the centre sorting. The only improvement mentioned was that there was room for another two positions ie 16 in total, at the Carousel which would be useful operationally.

There was another view that this pack off operation could be achieved easier with two parallel belts operating in opposite directions with an angled deflector at both ends to move the cut from one belt to the other until it got picked off. Packers could work on the outside of either side belt. Conveyors above could carry empty cartons and conveyors below and level with the cartons being filled could take away full cartons. A drawback to this process design is that every packer is identifying each cut, with no second check, and there is no buffer area. Cuts are put straight into cartons so the packers would need to move back and forward between “their” cartons rather than the Carousel system which allows cuts to build up in the buffer area until there are enough to fill a carton.

- **“Design and development of a continuous pack area for trim and manufactured product.”**

This part of the plant was not changed, so is not the subject of this report.

- **“Installation of historical event loggers and webcams to capture and record operating parameters.”**

No one could recall an installation of historical event loggers.

A small number of web cams, perhaps six, were installed. Some thought it was to enable the Machinery Development Ltd personnel to view the operation from NZ. However, the NZ personnel said the small cheap, battery operated type installed were not suitable for such work. It seems that they were removed within a few months of being installed.

2.3.2 Outcomes

1 **“Development of an innovation strategy (Business dimension)”**

This has been dealt with under 1.3.1 Objectives item 1.

2 **“Established benchmarks for the current operation”**

No benchmarks were established for either the established or the new operation that were documented.

3 **“Developed and designed Conveying system, room modifications to suit new conveyors”**

This was done successfully.

4 **“Installation and Design and Improve Primal Bagging Machines”**

A six bag multibagger was installed on Line1, the main line, and a four bag multibagger was installed on Line2. They are standard multibaggers. The 500m long of the widest roll ie 450mm wide, weighs 26.2kg. In the future, consideration may have to be given to buying shorter rolls to stay under the 20kg limit or use a mechanical lifter. The printers within the multibagger have already been discussed.

5 **“Pre-commissioning Change Management and Training.”**

There is evidence that Harvey tried to involve the operators in the final design and to keep them informed of progress by issuing fliers (unknown number) and having design review meetings prior to installation to which operators were invited, Appendix F. However, none of the packers or team leaders who were interviewed remembered being asked to comment on the design or layout.

6 **“Commissioning and Training Systems Integration Change Management”**

The new system was installed while the old system was still running. This allowed operators to get used to the new system. A memo issued in December 2006 indicates that training was done by allowing small numbers of cuts to flow through to the new equipment for trials and testing, Appendix G.

The new system suffers from having a shortage of staff trained in the operation and maintenance of the CutLink weighing, bagging and printing technologies. This may be due to the regular turnover of engineering staff.

7 **“Demonstrated reduction in injury rates amongst Packing area work groups and corresponding workers compensation premiums due to improved packaging equipment.”**

The new design installed in 2007, eliminated the physical stresses associated with lifting and bagging meat cuts, double handling of product, and reduced the manual transfer of cuts between conveyors. The new pack off area also reduced the postural stresses by introducing a continuous packoff design which eliminated overreaching when product was missed or when it travelled past the packer. The change in picking and packing product can be seen in the before and after photos, Appendix H.

There had been a significant reduction in injury rates among packers following the first major redesign in 1998. This has been improved further with the completion of this project, 2006/07. The CutLink bagging units eliminates lifting heavy cuts and the continuous pack off Carousel has reduced strain and sprain injuries by eliminating overreaching. It has allowed HIG to employ a disabled employee with one arm who effectively can identify and sort cuts effectively and safely on his own. The Carousel also eliminates full carton handling and multiple handling of primals.

There was no target in the Objectives or Outcomes for reduction of injury rates or compensation premiums. However, a reduction in sore wrists and arms was mentioned repeatedly during interview by all packers, and supervisors. The reduction in severity of injuries has been borne out by a recent reduction in compensation claims.

8 **“Demonstrated increased processing capacity through.....”**

- **“.....improved quality performance in selection and packaging of correct cuts”**

No documented data was collected and retained before or after this equipment installation project which substantiates the error rates in cuts packed in incorrect cartons.

However, there is no longer any stress in having to grab a cut as it goes past an operator which may have resulted in incorrectly identifying a cut in the past. There is also the advantage that the sorter at the Carousel has their decision verified when the packer moves the cut from buffer area to carton.

- **“.....reduction in waste and dropped product”**

No documented data was collected and retained before or after this equipment installation project which substantiates that there has been a reduction in waste and dropped product. However, there is a perception among packers and supervisors that there is less meat waste, particularly since HIG installed stainless steel trays below the CutLink units to stop unbagged product falling on the floor.

No documented data was collected and retained on plastic bag waste before or after installation of the CutLink technology which sizes the bag length and chooses the bag width compared with an operator choosing a bag width and having one bag length. There should be less plastic waste if the bag is cut to length.

There is no opportunity for bagged product to fall on the floor since the Lazy Susan was replaced by the continuous Carousel. However, this should not result in waste as the cut is bagged at this point.

Overall, there is 0.3% to 0.6% of dropped primal meat waste which goes to rendering, amounting to 100 to 150kgs per day when processing about 420 head. This is “substantially lower” than it used to be, anecdotally.

- **“.....reduction in rework and double handling”**

No documented data was collected and retained prior to or post implementation of this project. However, there is circumstantial evidence that multiple handling has been eliminated as there is no longer a collection point at the end of a pick off belt which necessitates trolleying missed cuts back to the start of the belt, nor is there a Lazy Susan collecting bagged cuts for return to the sorting belt.

Rework has particularly been reduced at the Cryovac since the “new” (refurbished) 5 chamber unit was replaced in July 2008 with a genuinely new 6 chamber unit

- **“.....reduction in labour and processing costs”**

Prior to installation of the new packing room equipment, it was thought that the 30 labour units used to process 450 head would translate into only using 19 labour units for 500 head. However, this has not been the case. As much if not more labour is used now to process the 250 to 350 head that is presently processed.

Any before and after comparison is complicated by the fact that HIG used to work day and night 9 hr shifts on 5 days and now there is a single 8 to 11 hr shift working 7 days per week. Also, in the last twelve months a large number of short term backpackers have joined the work force. This is potentially less experienced and so less efficient.

The new equipment only has an effect on the labour used in the Cryovacing of primals as the rest of the product is still packed as before. The Cryovac line requires one operator on the touch screen (when cuts are identified here), one bagging, one at the Cryovac, one sorter identifying cuts and 3 packing, with one team leader. The sorter even has time to weight range the bagged cuts while the scales on the CutLink are non operational but this entails lifting the cut on to the scales and carrying the cut to the correct weight range bay. Fully operational CutLink equipment removes this need to lift and carry.

- **“.....accurate response to errors and reduced turnaround time responding to these”**

There was no consensus view on what this meant.

- **“.....involvement of operators in the plant optimisation processes removal of subjectivity in reporting**

While none of the operators interviewed said they have any involvement in optimising the design of the layout, the team leaders do take an interest in the plant operation and do offer views on the process optimisation. They said it is not done in a formalised way.

In relation to the new pack off area, there was a lack of numerical documentation available on reporting such things as the amount of product waste, bag waste, dropped meat, double handling, rework, lost time injuries, medical treatment injuries, or the cost of any of these items related to, hours worked or number of labour units per shift. There appeared to be a lack of feedback to the operators or maintenance in how the equipment is running or the value in ensuring the scales and bag printer are in working order.

3 Conclusions

1. CutLink technology is conceptually a good idea. However, it is complicated, complex, highly technical and appears not to be robust. It needs regular skilled maintenance in order to fully function. If this high level of maintenance is not given then it does not give a return on its investment. It is capable of weighing all cuts, and printing cut identity and weight on a correctly sized bag. When labelling and weighing functions are disabled it is an expensive way of bagging cuts. There would need to be significant ongoing training for staff in order that the technology is all kept fully functional due to the large turnover of maintenance staff. All the manuals are available on line for maintenance staff to access. These two CutLink units were the most improved first generation design and a new second generation design is now being developed which has eliminated all faults that have been relayed to Machinery Developments Ltd. The second generation design is so different to the first generation that the new design cannot be retrofitted into the old.
2. The CutLink unit when originally supplied had problems of compatibility with the cleaning agents used on the plant, necessitating a replacement of all hydraulic hoses with alternate material and replacement of aluminium parts with stainless steel. Both gearboxes needed replacing soon after installation. The CutLink units as supplied were not easy to keep clean.
3. The CutLink system saves operators from lifting cuts into bags. It is an expensive piece of equipment if this is all it is used for although it's major success has been in the reduction of lifting cuts into bags.
4. The project has suffered greatly from not having a "champion". Machinery Developments Ltd speak highly of Peter Midgley and his commitment to making it all work. Unfortunately, with the company changing hands, the change of management, engineering, and most operators, there is no longer a champion, and the MLA person had little contact during the critical period before and after installation and is no longer available.
5. There is virtually no recorded information detailing the before and after situation and no evidence that formal systems were set up between HIG and MLA to collect this data.
6. The Carousel is a success. It operates trouble free. It removes the need for double handling and allows easy cut identification and packoff with minimal manual handling of bagged cuts with the opportunity to verify correct cut identification in an unhurried atmosphere.
7. There has been no reduction in labour but a reduction is possible if all meat cuts go to fully functional CutLinks equipment.

Fig 1. Packing room layout, 2003/04

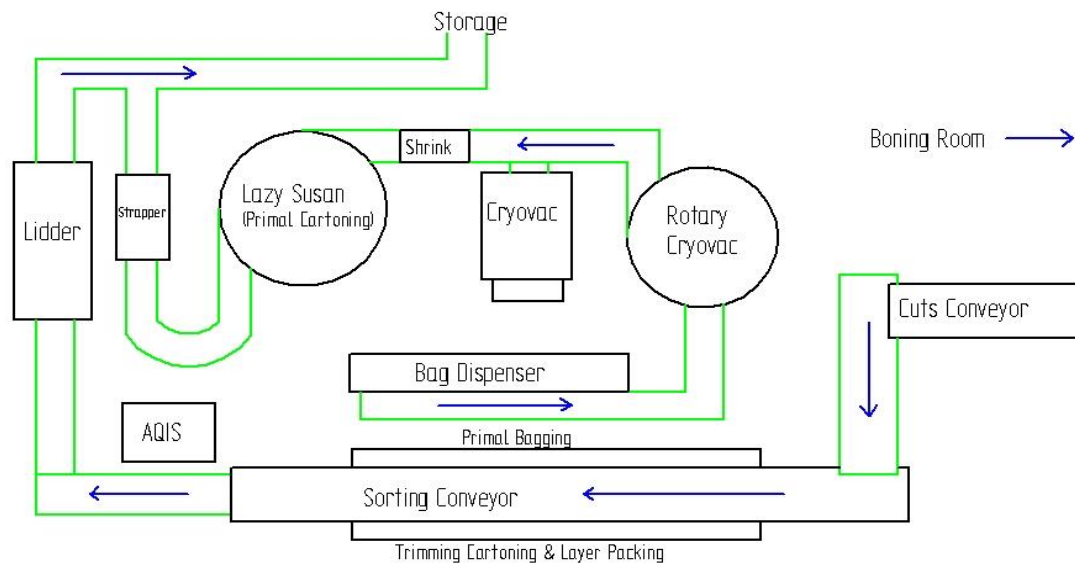
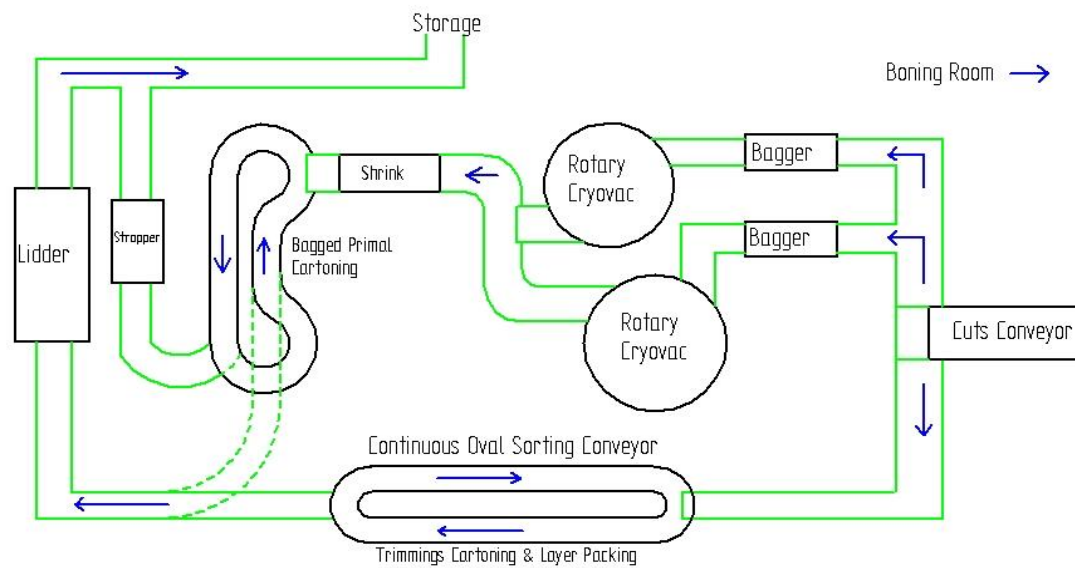
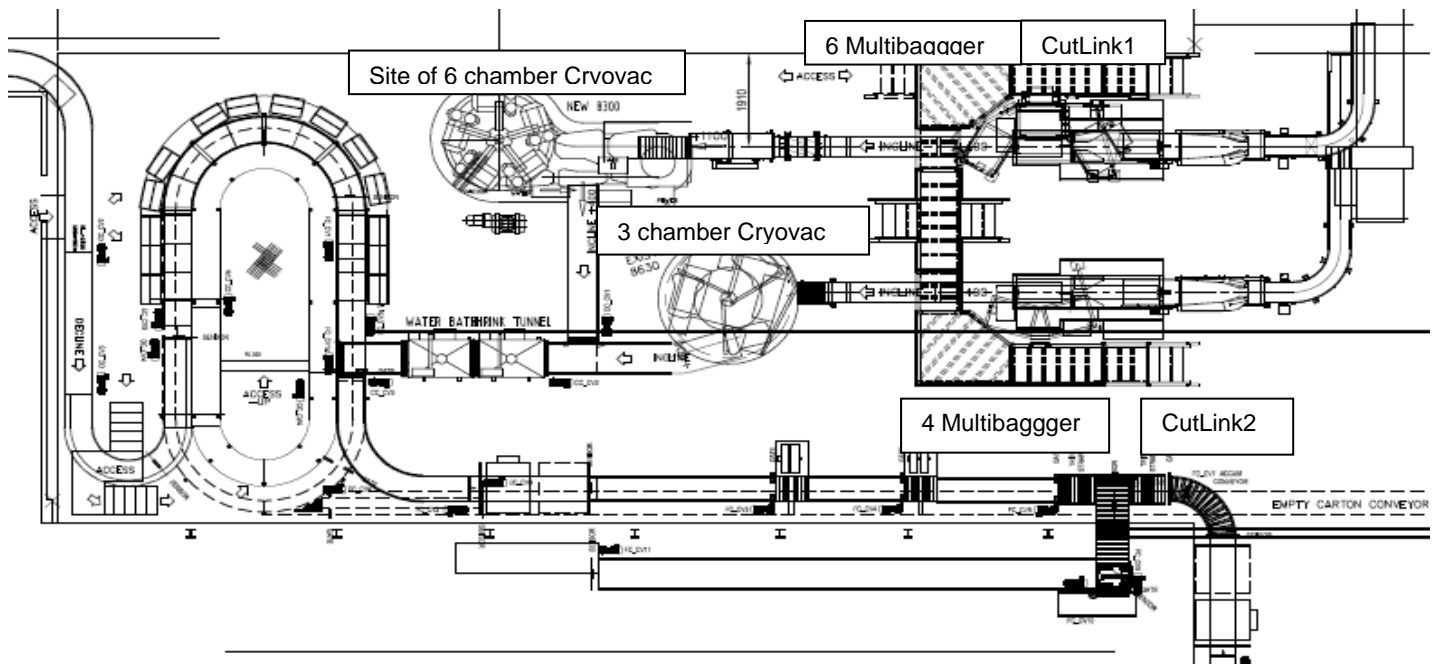


Fig 2. Proposed packing room layout





4 Appendices

4.1 Appendix A

A packing room 2003



Overloading of the Lazy Susan is a regular occurrence.



Meat cuts collecting in the end tray when “missed” by the Operators



Operator is required to turn back and forth to (1) obtain bags (left of figure), (2) bag primal cuts from sorting conveyor (right of figure) and (3) place bagged meat onto Cryovac conveyor (left of figure).

4.2 Appendix B

MLA R&D PROJECT AGREEMENT WITH HARVEY INDUSTRIES GROUP

Purpose and description

There is a wealth of research that identifies that a holistic approach to technology implementation is the only way to ensure successful implementation and positive impact on the drivers of the project. Implementation should not be confused with installation of technology for it involves a change in companies. Change has to be pursued, not only in terms of technology, but also in terms of associated organisational and business dimensions. Failure to do this can severely limit the impact and success of the application to the business.

This project aims to improve the competitiveness of a Meat processing company through the improved processing infrastructure introduced and implemented considering and implementing good sociotechnical design processes.

The infrastructure and the supporting systems aims to:

- Reduce costs, waste, rejects and downtime
- Increase transparency and visibility of teams and company performance
- Develop internal capability and teams who develop, sustain and take ownership of improvement initiatives
- Improve communication, morale and safety performance

New technology, ergonomic design and fundamental process and systems changes, are too often not supported by a comprehensive organisational change management and transition plan. This process ensures that:

- The new processes are understood and managed
- Changes are effectively communicated to all staff
- The new systems and processes are integrated into peoples roles and work instructions
- The whole rollout is supported by a well planned and structured training and support program
- The change management strategy is capable of translating organisational strategy and customer requirements down to the practices at the shop floor level.

Objectives

1. Develop Innovation Strategy (Business Dimension)

A key requirement for MLA is to build processor capability and innovation. A strategy for undertaking this has been developed by Christine Raward. The first step of the project will run in parallel with the program aimed at increasing processor innovation capability. The first step in the process is for MLA and Harvey Industries Group to work together to develop and document a clear innovation/business strategy. Developing an innovation strategy will be of benefit not only for this project but will integrate product and process developments proposed are in line with the overall business strategy.

2. Benchmarking and evaluating economic costing of labour and retention undertaken and benefit of sociotechnical design.

Measurement of the true cost of turnover is not undertaken in the industry and therefore the true impact of such initiatives cannot be measured. It is important that an industry specific tool be developed and tested. It is well accepted that labour related issues are on of the top 5 concerns of all Australian red meat processing companies. The benchmarking and measurement throughout the project will also highlight and measure the benefits of utilising the sociotechnical design when introducing new processes.

3. Technical design and implementation of workplace changes undertaken in packing are (Technology and Organisational Dimensions)

Productivity – Design Innovation

Installation of cut link technology to identify, weigh and label product during packaging process

- Simplification of cut identification and error proofing during primal/sub primal cut identification
- Development of automated bagging equipment which increases packing capacity to 40 cuts per minute
- Design and development of a continuous pack off area for trim and other manufactured product
- Installation of historical event loggers and webcams to capture and record operating parameters

Outcomes

Development of an innovation strategy (Business dimension)
Established benchmarks for the current operation
Developed and designed Conveying System, room modifications to suit new conveyors
Installation and Design and Improve Bagging Machines
Pre-commissioning Change Management and Training
Commissioning and Training Systems Integration Change Management
Demonstrated reduction in injury rates amongst Packing area work groups and corresponding workers compensation premiums due to improved packaging equipment
Demonstrated increased processing capacity through
Improved quality performance in selection and packaging for correct cuts
Reduction in waste and dropped product
Reduction in rework, and double handling
Reduction in labour and processing costs
Accurate response to errors and reduced turnaround time responding to these
Involvement of operators in the plant optimisation processes removal of subjectivity in reporting

4.3 Appendix C

PERSONNEL INTERVIEWED

Todd Brooks	Chief operations officer
Michelle Chatfield	Risk Manager
Cosi Stephano	Production Planner
Bill Jones	Boning room supervisor (gold)
Peter	Boning room supervisor (green)
Heather Thompson	Boning room Packing team leader
Kate Kenning	Boning room team leader
Melissa Walker	Boning room production planner ex packer
Gary Bennett	Electrical apprentice
Richard Melville	MD, Machinery Developments Ltd
Anthony Matos	Automation Systems, Machinery Developments Ltd
Dean McLean	Mechanical Engr, Machinery Developments Ltd
Colin	Thermal Coding Australia

4.4 Appendix D

MACHINERY DEVELOPMENTS P/L (AUTOMATION SYSTEMS HELP DESK)

The screenshot shows a web browser window titled "Autosys.co.nz - Help Desk - Windows Internet Explorer". The address bar displays "http://www.autosys.co.nz/helpdesk/index.php". The browser's menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The toolbar shows standard navigation buttons and a "Live Search" field. The website header features the "Automation Systems" logo and the text "Help Desk". A horizontal bar with the word "SOLUTION" is visible. The main content area is divided into two columns. The left column contains a list of links organized by category: "Software Update BLOG", "Operation", "Startup Checklist", "Mechanical" (with sub-links like "MultiBagger Maintenance", "Multiloader Drawings", etc.), "Electrical" (with sub-links like "Multiloader Elect /Pneu Drawings", "Moxa TCP-RS232 Programming", etc.), and "Software" (with sub-links like "CutLink Software Operator Manual", "Cutlink Software Technical Manual", etc.). The right column contains a "Search:" field, a "Welcome to Automation Systems Help System" message, a "Please choose topic on the left." instruction, and a "LOGOUT" link with a "Code:" field. The browser's status bar at the bottom shows "Page" and "To" buttons.

Autosys.co.nz - Help Desk - Windows Internet Explorer

http://www.autosys.co.nz/helpdesk/index.php

File Edit View Favorites Tools Help

Autosys.co.nz - Help Desk

Automation Systems Help Desk

SOLUTION

- Software Update **BLOG**
- **Operation**
- Startup Checklist
- **Mechanical**
- MultiBagger Maintenance
- Multiloader Drawings
- MultiBagger Manuals
- CutLink Manuals
- Multiloader Parts & Assembly
- MultiBagger Belt Setup
- Printer Platen Setup
- **Electrical**
- Multiloader Elect /Pneu Drawings
- Moxa TCP-RS232 Programming
- ASI Module Numbers
- TCP/IP Addresses
- Training Tip sheet
- Scale Setup
- Bagger PLC Manuals
- Stepper Amp Manual /Installation
- Touchscreen Manual
- ASI Presentation
- **Software**
- CutLink Software Operator Manual
- Cutlink Software Technical Manual
- PC Setup
- Scheduler Manual
- Scheduler Install file
- Scheduler setup instructions

Welcome to Automation Systems Help System

Please choose topic on the left.

Search:

LOGOUT

Code:

4.5 Appendix E

WOODEN MOCKUP OF PACKOFF AREA DESIGN TRIALS



4.6 Appendix F

CHANGE MANAGEMENT DOCUMENTATION

Item 1:

Packing Area Upgrade

MARCH 2005 UPDATE


The new packing area is finally starting to take shape. There have been few changes in the layout of the equipment including the reorientation of the IVV pack off area. This allows more space and provides an opportunity to label and inspect before the lid is applied to the carton. Space has also been allocated to support the future installation of a second 5 chamber rotary cryovac. The original provisioning is for a 5 and a 3 chamber cryovac. This increase in cryovac capacity is required to meet future packaging needs.

The multi bagger and cut link have been constructed in New Zealand, and arriving on site within the next three weeks will be a prototype manufacturing pack off area. On it's arrival we need to have packers review the design and dimensions, confirm the location of scales, touch screens etc. carton orientation and mechanisms to align cartons on scales and to assist the transfer back onto the conveyor will also need to be determined. This prototype will be available on site to allow all people to have a look and provide feedback.

Design parameters for bag loading and roll loading facilities are currently being reviewed. We aim to eliminate the manual loading of the bagging machines.

There will be a lunch time meeting with all packers on Wednesday 9th March and Thursday 10 March at 1pm-1.30pm sharp. At this time the entire layout and basic design will be reviewed with the team and a working party confirmed to review and provide feedback to engineering to ensure that all needs are covered.

We understand that there has been a significant delay in the improvements for the packing area. This is primarily due to the redesign and decision to complete the boning, slicing and packaging area upgrades at the same time. Redesign of the boning and slicing work stations as with the packing area aims to increase productivity whilst improving the ergonomic layout and design of these work stations. We remain on schedule at this stage to have the upgrades ready for production in September 2005. Site works will commence over the next few months to accommodate the building extension. We encourage teams to take an active and constructive role in reviewing and providing feedback on the proposed layout and design so that any improvements can be made during this design phase.



Special points of interest:


**Lunch time meeting for each shift
Wednesday 9th March and
Thursday 10 March at 1pm-1.30pm sharp**

Take a look at the drawings in the corridor

Look out for the arrival of the prototype manufacturing pack off area

Turnover to see the new draft layout

PTO



4.7 Appendix G

CHANGEOVER TO NEW PACKAGING AREA MEMO



Boning Room modifications to support changeover to new packaging area

As you would be all be aware the new packaging area have been taking shape over the past 3 months. Final preparations are underway to facilitate the changeover and transfer of meat products to the new packaging area. Once the installation activities are complete, commissioning and training activities will commence. This commissioning period is expected to take approximately 4-6 weeks. During this time we will be reviewing the process to ensure a smooth transition and optimal functioning of the equipment. In the mean time the existing packaging area will be operating as normal.

Two changes to the Boning Room work process will be occurring this weekend. The first of these changes will be the relocation of the Triton station to the new packaging area. The second is the splitting of the main meat belt to allow small amounts of product to be directed through to the new area for trials and testing.

The main meat belt is being split to allow separation of trim or manufacturing meat products and primals. The new belt will consist of two 400mm belts with a 100mm spacer in between. In the first instance, the belt will be operating as it is currently, however once the new packaging area is fully operational, primal and bagged products will be directed towards the new room.

The new packaging area provides significant benefits as it eliminates manual bagging of meat cuts, reduces double handling of product and removes existing productivity restrictions related to product congestion within the packaging area. The commissioning of the new packaging area will require some flexibility and we will be working hard to ensure that this transition is smooth and without significant disruption.

Barry Davis
Production Manager
8 December 2006

4.8 Appendix H

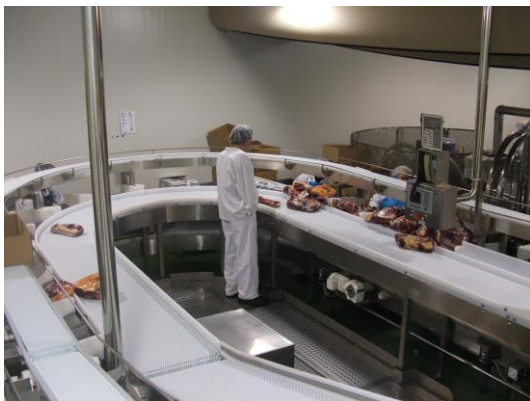
PICKING AND PACKING PRODUCT (before & after project)



Old pick & pack conveyor



Carrying cartons (May 2005)



New pick & pack conveyor



Old bagging method



New bagging method