

final report

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Safe Rail Switching

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Safe Rail Switching

Project Objectives

To design and construct a rail switch which allows carcasses to be switched between two other rails in such a manner that the open end of a third rail is effectively blocked to prevent falling carcasses.

To highlight a typical solution for processors who seek a solution to this problem.

The design is to be simple to construct and operate.

The design used will be for beef rails and will be air operated.

Introduction to Rail Switch Systems

This project was initiated in cooperation with Cargill Foods Australia, Wagga, NSW, who were experiencing a high incidence of 10 to 20 fallen beef sides per week from the header rail used to convey carcasses from a row of nine beef chillers to their beef boning room. The rail and switch layout of this system is shown in Figure 1.

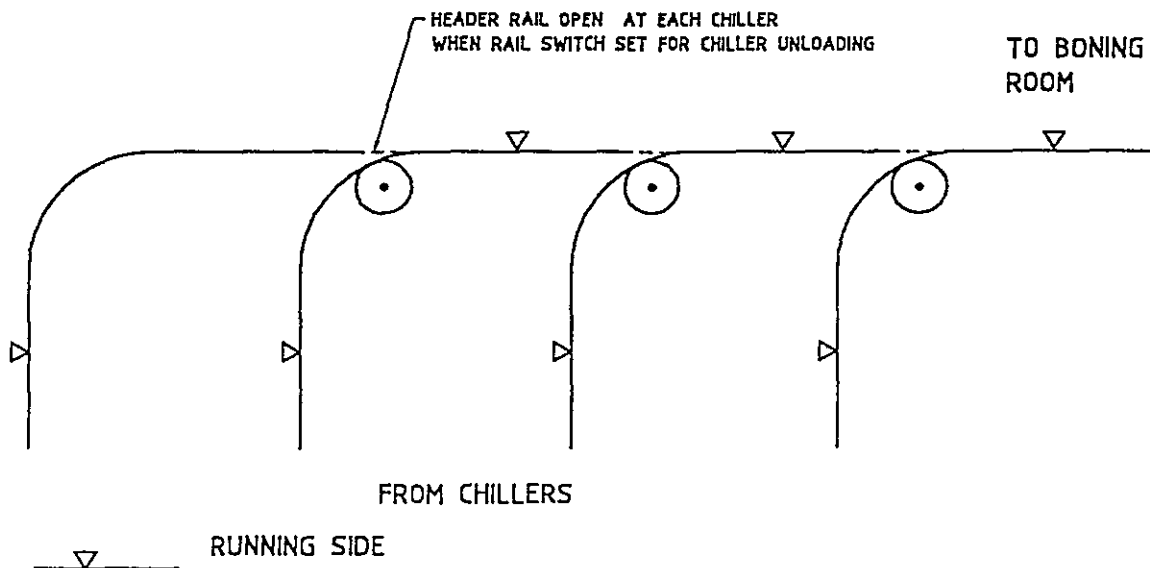


Fig 1 - Existing beef Chiller Unloading Rail System - All Switches are "Outside Left"

The following observations are relevant to this operation and contribute to the incidence of fallen carcasses:

- The running side of the rail requires that there is gap in the header rail at every chiller exit point when the rail is switched to the chiller.
- There is no open end possible at the chiller discharge rail, irrespective of the rail switch position. Therefore, no fallen carcasses would be anticipated in moving carcasses out of the chiller for either switch position.
- If the running side were reversed in the original design, then carcasses would be unlikely to fall off the header rail but the chiller exits would be at risk.

Cargill Foods Experience with Fallen Carcasses:

The Problem

Cargill Foods, Wagga, have an estimated 176 rail switches throughout their beef and sheep processing plant. The major area of concern is the header rail on the discharge from beef side chillers to the boning room, where, as explained above, 10 to 20 carcasses fall per week. The general procedure for managing the transfer of carcasses from these chillers to the boning room is as follows, refer to Figure 1:

1. A pole is used to actuate the rail switches. There is one pole at each chiller door
2. The operator is required to hang the pole over the header rail when the switch is set to the chiller.
3. The switch should always be reset to the header rail except when a chiller is actually being emptied
4. Operators may push any number of carcasses on the header rail at the one time.

The ongoing incidence of fallen carcasses demonstrates the failure of the operating procedure. This is a classic case where equipment design fails to ensure a safe or satisfactory operation for the following reasons:

- There is more than one operator involved
- There are no mechanical or electrical systems or interlocks which ensure the system is fail safe, or provide any sort of alarm to the operator.
- Operators do not always check chiller rail switch positions, and/or use poles to indicate switch positions before moving carcasses.

Like other meat processors who deal with this problem, Cargill Foods have other areas where fallen carcasses occur but with less frequency.

Safety Considerations

Carcasses may fall from rails for two reasons:

- They come off an open rail end
- The roller or skid jumps off the rail - the greater the number of carcasses being pushed at the one time the greater the risk of one or more falling if an inflexible stop is used to stop them suddenly, or a jam occurs.

The Solution - an Automatic Air Operated Stop

An air operated mechanical stop was manufactured and installed to protect the open rail end when the rail switch is set to one position and automatically retracts in the alternative position. The air operated stop is operated by a pneumatic valve actuated by the rail switch.

The air operated stop may be manufactured in either left or right hand and used with most commercial rail switches in use in the meat industry. However, the pneumatic actuating valve and mounting bracket will have to be selected for each type of rail switch

The drawing and video represent the rail switch designed and manufactured by AMT for Cargill Foods. This uses a spring return 50 mm air cylinder to actuate a finger under the rail. This provides a simple and neat installation and is designed to accept a load of about 100 to 150 kg on the finger at 600 kPa air pressure. This stop design proved satisfactory for stopping at least six 150 kg beef sides. The estimated production cost is about \$500-00, with an installed cost of \$600-00 to \$800-00 including compressed air piping and valves.

Benefits

Automatic rail switch stops prevent carcasses falling from the open ends which occur in all typical meat rail switch systems. They prevent:

- OH&S injuries to personnel, who may either be struck by a fallen carcass or suffer strains when recovering the carcass from the floor.
- Trimming losses.
- Labour costs associated from recovering and trimming fallen carcasses.

Design Details

This switch is designed to bolt to the side of the rail. Air is required to actuate the cylinder to block carcasses. When the air is shut off, the cylinder retracts and allows carcasses to pass.

| Parts List - Rail Switch Stop | | | |
|-------------------------------|------------------------------|---|----------|
| Part No | Description | Specification | Quantity |
| 1 | Mounting Plate | Galvanised Steel | 1 |
| 2 | Cylinder | Pneutech Model APS50B50, 50 stroke, 50 bore, spring return, stainless steel rod, trunnion mount and cleavis pin | 1 |
| 3 | Cylinder Mounting Pin | Stainless Steel | 1 |
| 4 | Circlip | 12 dia | 2 |
| 5 | Cylinder Cleavis Pin bolt | Stainless Steel with 10 dia nut and washer | 1 |
| 6 | Circlip for Cleavis Pin | dia (TBA) | 1 |
| 7 | Stop Finger | Galvanised Steel, 10 mm | 1 |
| 8 | Stop Finger Bush | Steel | 1 |
| 9 | Stop Finger Socket Head Bolt | 55 long x 12 dia with nut and washer | 1 |
| 10 | Rail Assembly bolt | Socket head screw and nut, 10 mm | 3 |

The cylinder may be ordered from Pneutech Pty Ltd, 4/13 Molan Street, Ringwood, Victoria, 3134, Ph 03-98796499, Fax 03-98796366 for a cost of \$293.60 (as of 6.10.98).

The rail switch stop may be manufactured as either left or right hand. The parts should be lightly lubricated on assembly. The assembled stop mechanism is bolted to the carcass rail. This requires drilling of 3 countersunk holes 10 mm dia in the rail to match those of the mounting plate.

Two other items are also required:

- A three way pneumatic actuating valve
- A mounting plate for the valve

The selection of the valve should be made in conjunction with your usual supplier of pneumatic components and valves. The mounting plate should be manufactured to suit the style of rail

switch., with the plate and valve mounted so that air is supplied to the rail stop when there is an open rail end. The air is exhausted from the cylinder when the rail switch is moved. It is beyond the scope of this report to provide these details because of the wide variety of switch designs and manufacturers in use.

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