

# PREVENTION OF CANE LOSS FROM SPILLER TRAILERS

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## Abstract

In the South African sugar industry, sugarcane is usually transported from field to mill in spiller vehicles. At the mill, spilling of the load is effected by chains, on to which the cane bundles are loaded in the field. The system may result in revenue loss from cane lost *en route*, cane remaining in the vehicle after spillage, littering penalties and cleaning costs, and time lost in vehicle cleaning. Experiments were conducted in which the chains were replaced by a wide canvas blanket supported by nylon straps. Better efficiency and cost savings were achieved.

## Introduction

Since the introduction of the spiller vehicle to the sugar industry, sugarcane has been removed from vehicles by spiller trailers, which use a built-in spiller bar and chains. Advances have been made by the introduction of herc-alloy chains, which are lighter and allow greater payloads.

However, in terms of cane spillage, no successful advances have been made in reducing cane losses while the vehicle is in transit, nor for ensuring the complete removal of cane from the vehicle during the spilling operation. Recent changes in the Road Traffic Act include heavy penalties for vehicles that spill cane on the highways and freeways, and for those that are overloaded. Revenue may be lost also through road cleaning expenses and through time spent in cleaning out vehicles at the mill.

At Mount Edgecombe a system has been developed which addresses some of these issues, and which will, if successful, be of benefit to the sugar industry.

## Method

The original concept, as shown in Figure 1, was to use throughout the length of the trailer a continuous 'blanket', manufactured from a durable nylon that would be sufficiently strong to support the cane while it was being spilt. Two factors precluded this proposal: first, a section of nylon belting this size would be extremely costly and secondly, manufacturing a blanket this size would be difficult.

To retain the principle of a continuous nylon blanket, it was decided to use nylon straps sewn to the canvas blanket. These straps provide the load bearing requirements and the canvas forms the continuous blanket.

Nylon straps range from 50 mm to 250 mm in width, with a proportional increase in load carrying capabilities. It was calculated that, by using the 50 mm straps spaced at 250 mm intervals, the blanket would be sufficiently strong to replace the chains.

The 12 ton direct haulage spiller trailer used for the experiment was fitted with 21 chains, which were attached between the trailer and the spiller bar. To simplify the experiment, the same attachment points were used to locate the 50 mm straps supporting the blanket, as shown in Figure 2.

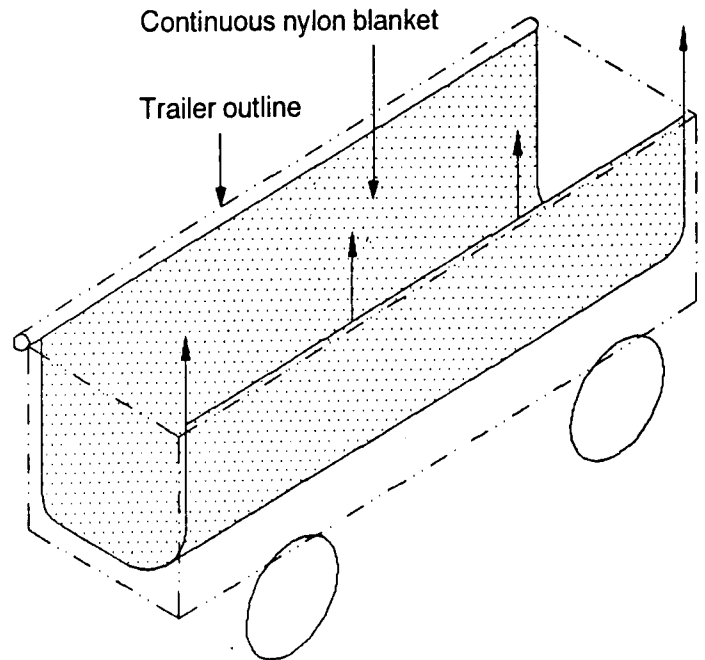


FIGURE 1 Principle of continuous blanket.

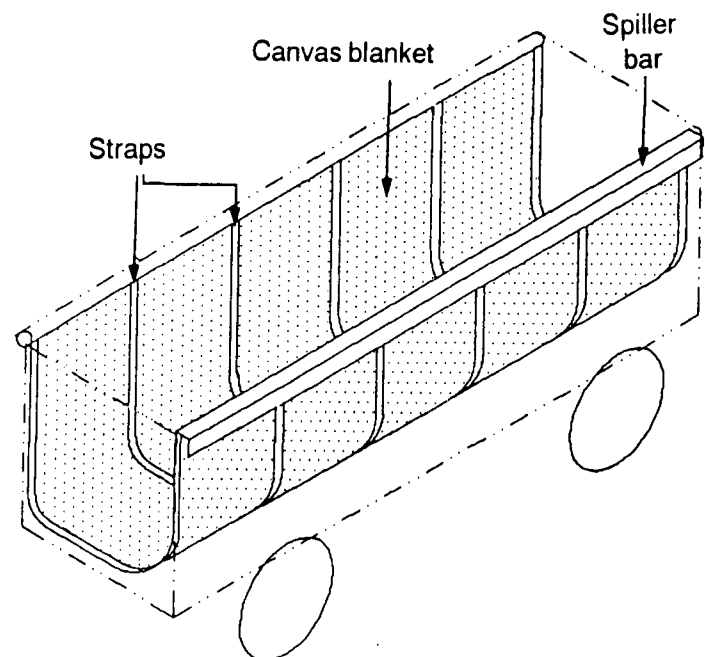


FIGURE 2 Canvas blanket supported by multiple straps.

## Results

### Experiment 1

The first blanket tested was not exactly to specification. The manufacturer had used the 50 mm straps, but had in addition attached sheaths to the blanket through which the

straps were threaded. Points learned from using this blanket were:

- As the canvas was not attached to the straps, the canvas blanket slipped and bunched at the bottom of the trailer.
- Sharp projections inside the trailer tore the canvas.
- As the available attachment points of the trailer were used and because there were more straps than attachment points, some of the attachment points supported two straps, which resulted in unequal tension. It is important that the length of the straps be correct, so that they all perform similarly, and that each strap has its own attachment point.

#### Experiment 2

The original canvas blanket and straps were returned to the manufacturer for modifications. The sharp projections within the trailer were removed and additional attachment points were fitted at the extreme ends of the trailer. Points learned from using the modified blanket were:

- The removal of the projections stopped further tearing of the blanket.
- When each strap was attached to an individual point, the loading on the straps was uniform and they worked together.
- The request to sew the canvas to the straps was not done and the bunching of the canvas continued.

#### Advantages

##### Cost savings

The following cost savings were based on a crop of 528 000 tons, and calculated on a cost per ton basis:

Labour for cleaning of vehicles	R 99 792
Labour for clearing agricultural roads	R 34 587
Cleaning of roads around mill (contract)	R 24 000
Cane in transit	R 31 280
Lost use of vehicles (turn around time)	<u>R1 524 096</u>
Total	R1 713 755

This implies a cost of R3,24 per ton, which will increase with cane tonnages and labour costs.

In terms of 'lost use of vehicles', a survey was undertaken to establish the cost of not using vehicles during cleaning time. The figures used are based on current information. The survey was conducted over a 48 hour period and revealed that the average time taken for cleaning was 24 min per vehicle per haulage cycle. In 1992, as a result of the short cane processed during the drought period, 24 minutes was excessive, compared with the normal time delay. In Road Freight Association terms, the cost of a vehicle is R135 per hour.

Therefore, the potential total cost of delays is:

$$24/60 \times R135 = R 54 \text{ per cycle}$$

At a crushing rate of 166 tons per hour, seven vehicles are required to move the cane.

This implies

$$R54 \times 7 \text{ vehicles} = R378 \text{ per hour}$$

or

$$R54 \times 7 \times 24 = R9\ 072 \text{ per 24 hour period}$$

at 168 days per season

$$R9\ 072 \times 168 = R1\ 524\ 096$$

#### Comparison of material costs and masses

##### Spiller trailer equipped with chains:

The 12 ton direct haulage trailer uses 21 chains each 7,5 metres long. At 2,23 kg per metre, this amounted to a total mass of 351 kg. The chain costs R2 756.

##### Spiller trailer fitted with blanket:

The proposed blanket weighs about 45 kg. The cost is about R3 000-R3 500.

##### Additional revenue

Other forms of revenue which have not been quantified are:

- Increased payloads
- Fewer traffic violations
- Improved time use of vehicles.

#### Disadvantages

The main disadvantage of this closed spiller system compared with the conventional open chain system is the probable increase in ash per cent cane, which will have a detrimental effect on the mills and boilers since sand is extremely erosive. This can however be overcome by removing the sand before it reaches the milling tandems. This would create a requirement for a correction factor in terms of the cane payment system.

#### Conclusions

- The estimated cost savings are conservative, but undoubtedly the potential revenue is high.
- Further tests are required to ascertain whether a synthetic medium can be used to replace the well tested chains. The durability of the synthetic medium has to be established for wear and tear, and for corrosion from sugar juice.
- Cane spillage on freeways is a hazard to other road traffic, and often uncomplimentary comments are frequently levelled at the sugar industry in this regard.

#### Acknowledgements

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