

Strategic Sugarcane Transport Research at the University of KwaZulu-Natal

University of KwaZulu-Natal (UKZN)

RESARCHERS AT UKZN HAVE BEEN WORKING IN THE SUGARCANE TRANSPORT INDUSTRY FOR MORE THAN A DECADE. THIS INCLUDES A WIDE RANGE OF TOPICS SPANNING OVER VARIOUS DISCIPLINES. HOWEVER, THE UNIVERSITY'S ROLE IS NOT ONLY TO PROVIDE HIGH CALIBRE RESEARCH OUTPUT, BUT ALSO TO DRIVE SKILLS DEVELOPMENT FOR THE SUGAR INDUSTRY. IN THIS ARTICLE REFERENCE IS MADE TO A NUMBER OF AVAILABLE SASTA PROCEEDINGS PUBLICATIONS WHERE THE UNIVERSITY MADE SOME CONTRIBUTION IN SUGARCANE TRANSPORT RESEARCH (SEE TABLE 1). ALL THESE PAPERS ARE AVAILABLE ON THE SASTA WEBSITE ([WWW.SASTA.CO.ZA](http://www.sasta.co.za)).

The sugar industry's contribution to this research is by way of funding a Senior Research Fellow at the School of Bioresources Engineering and Environmental Hydrology at UKZN. In addition, the South African Sugarcane Research Institute provides supervision to students.

It should also be noted that a large amount of funding is sourced from outside the sugar industry – most notably from the Department of Transport.

Papers on minimising the costs associated with in-field cane extraction

In-field cane extraction is often more expensive than expected. The impacts of compaction on the soil [1], stool damage and high tractor-trailer transport costs all contribute significantly to the grower's pocket. It is, therefore, important to balance the trade-offs between different cane extraction solutions.

TABLE 1
LIST OF USEFUL REFERENCES FOR TRANSPORT IMPROVEMENT *

[1]	Marx, B. J., Bezuidenhout, C.N., Lyne, P.W.L., 2006. <i>Soil compaction decision support</i> .
[2]	Bezuidenhout, C.N., Lusso, C.D., Lyne, P.W.L., Meyer, E., 2004. <i>Minimising transport costs through optimal upgrading of roads and loading zones</i> .
[3]	Barnes, A. J., Meyer, E., Schmidt, E., 2000. <i>Evaluation of methods to reduce harvest-to-crush delays using a simulation model</i> .
[4]	Lagrange, L.F., Pletts, T.R., Bezuidenhout, C.N., Lyne, P.W.L., 2008. <i>The feasibility of on-board weighing systems in the South African sugarcane transport industry</i> .
[5]	Giles, R.C., Bezuidenhout, C.N., Lyne, P.W.L., 2005. <i>A simulation study on cane transport system improvements in the Sezela mill area</i> .
[6]	Harris, A. J., Bezuidenhout, C.N., Lagrange, L.F., Lyne, P.W.L., 2008. <i>Development of a sugarcane transport route planning model in a geographical information system</i> .
[7]	Cowling, LS. 2008. <i>Mechanical design optimisation of a sugarcane haulage vehicle</i> .
[8]	Thorogood R, Bright G, Nordengen P, Lyne P.W.L., 2009. <i>Performance-based analysis of current South African semi-trailer designs</i> .

*Available at www.sasta.co.za

Researchers at UKZN have developed valuable methods to establish the best spread of loading zones on a farm [2] and also assessed the impact of different systems on harvest to crush delays [3].

Papers on saving in mill-haulage costs

Several cost saving opportunities exist in the mill-haulage leg of the supply chain. Vehicle payloads can be better managed when load cell technologies are used [4], vehicle scheduling can be implemented [5] and shortcut routes can be constructed [6].




Figure 1. Photos of vehicle payloads to assess the factors that drive payload efficiencies.

The University has developed a number of decision support systems to assist the industry with these aspects. Performance Based Standards vehicles were recently implemented in the timber industry and researchers at UKZN have worked on new vehicle design issues [7] and at simulating the dynamics of such vehicles in the sugar industry [8].

Payload efficiency

Currently there is a strong focus on payload efficiency since a large number of vehicles are still under-loaded when they arrive at the mill. It is currently estimated that vehicles are on average four tons under-loaded. This amounts to approximately R64 million per annum overspending on transport costs.

Currently University researchers are assessing the loading operation in an attempt to better understand these dynamics and we are comparing the photos and weighbridge data of hundreds of sugarcane consignments at Sezela. Figure 1 shows some of these photos.

Future projects are likely to focus on performance improvement of loader operators and evaluate the match between loaders and vehicles in terms of their design strengths and limitations. 

Carel Bezuidenhout
School of Bioresources Engineering and Environmental Hydrology
University of KwaZulu-Natal

