

Paper on structural performance of concrete pavements wins award

A [research paper](#) co-authored by CSIR Built Environment researcher Louw du Plessis has won the award for best paper presented at an international workshop on best practices for concrete pavements, held in Recife, Brazil, in October 2007.

More than 250 delegates attended the conference, arranged by the International Society of Concrete Pavements, the Brazil Concrete Society and the University of Sao Paulo. A total of 41 papers were presented by researchers and industry experts from Belgium, Brazil, Holland, South Africa, Sweden, the UK and the USA.



Louw du Plessis presents the award-winning paper

Extensive use of cncPave, a mechanistically-based road design method used by road designers and authorities, has created an awareness of the sensitivity of the program's different input parameters. "Monitoring of the program's reliability, together with feedback from practitioners, has indicated that the program could be further improved, particularly by refining the load transfer module," Du Plessis explains.

A load transfer coefficient C was introduced into cncPave to distinguish between the load transfer capabilities of plain aggregate interlock and doweled jointed pavements so that the differences in performance of these different concrete pavement types could be explained mechanistically. This approach, together with feedback on the performance of concrete pavements in South Africa, and subsequent heavy vehicle simulator (HVS) testing on test sections at Hilton in KwaZulu-Natal, are being considered in the process of updating and improving design and construction procedures.

"Based on the use of cncPave and monitoring of the performance of existing concrete roads, it became clear that research was needed to establish the effects of joint or crack width, aggregate type and the environment on the structural performance of plain and doweled jointed pavements. This was achieved through the evaluation of full-scale test sections with the aid of the HVS," says Du Plessis.

Titled *Accelerated pavement testing of load transfer through aggregate interlock and the influence of crack width and aggregate type - a case study*, the award-winning paper discusses the prediction of crack width using the International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM) model, which predicts early age shrinkage. The model was modified for South African conditions to include the effects of aggregate type, environmental conditions and age.

The paper reports on the change in load transfer at the joints and cracks, as indicated by the relative vertical movement of the transverse edges of slabs on either sides of joints or cracks under dynamic loading, and the effects of temperature variation and humidity. The final outcome of the study is presented in terms of theoretically-based equations calibrated through HVS evaluation and real field experience. These equations are incorporated into the latest version of the cncPave program (version 3.30), launched in September 2007.

Co-authors on the paper were engineering consultant Pieter Strauss, Bryan Perrie of the Cement and Concrete Institute and SANRAL's Dennis Rossman.

