



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
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# **Steel Fiber Reinforced Concrete Ground Slabs**

## **A Comparative Evaluation of Plain and Steel Fiber Reinforced Concrete Ground Slabs**

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A dissertation submitted in partial fulfillment of the requirements for the degree of

**Master of Engineering (Transportation Engineering)**

In the  
**Faculty of Engineering**  
**University of Pretoria**

20/2/2001





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ABSTRACT

**Steel Fiber Reinforced Concrete Ground Slabs**

**A Comparative Evaluation of Plain and Steel fiber Reinforced Concrete  
Ground Slabs**

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Steel Fiber Reinforced Concrete (SFRC) is defined as concrete containing randomly oriented discontinuous discrete steel fibers. The literature on SFRC revealed that addition of steel fiber to concrete improves its engineering characteristics and impart a significant after cracking toughness, which make the material superior for ground slab applications.

In this study the effect of steel fiber content on properties of concrete was investigated by using beam and cube specimens, SFRC was compared with plain concrete. A comparative study was conducted by applying a static load on two full-scale slabs having different depths. The first slab is SFRC and the second is plain concrete having identical mix to the first slab but containing no steel fibers. The measured loads and deflections were compared to theoretical calculated values using models given by Westergaard, Meyerhof, Falkner et al and Shentu et al.

It was found that the steel fiber content has an influence ranging between little and significant on the tested properties. The load capacity and deflection value for the SFRC slab was approximately equal to that of plain concrete bearing in mind that the SFRC slab had 16.6% less depth. The theoretical loads and deflections did not correlate with the measured values.





## BLOKEER

### Staalveselversterkte Beton Grondvloer Blaaië

‘n Vergelykende studie van gewone en staalveselversterkte beton  
grondvloerblaaië

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Staalveselversterkte beton word gedefinieer as beton wat willekeurig georiënteerde, diskontinue, diskrete staal vesels bevat. Literatuur dui daarop dat die gebruik van staalvesels in beton die ingenieurseienskappe sowel as die na-gekraakte taaieheid van die beton kan verbeter en dus die material meer geskik maak vir gebruik in grondvloerblaaië.

Tydens hierdie projek is die effek van die toevoëging van staalvesels op die eienskappe van beton ondersoek deur die gedrag van balke en kubusse wat staalvesels bevat te vergelyk met soortgelyke monsters wat nie vesels bevat nie. ‘n Vergelykende studie is uitgevoer deur twee volskaalse grondvloerblaaië, met verskillende diktes, staties te belas. Die eerste blad het staalvesels bevat terwyl die tweede blad gegiet is met ‘n identiese betonmengsel wat nie vesels bevat het nie. Die gemete belastings en defleksies is vergelyk met teoretiese waardes soos bereken met die modelle voorgestel deur Westergaard, Meyerhof, Falkner et al en Shentu et al.

Daar is bevind dat die staalveselinhoud van beton die gemete materiaaleienskappe tot ‘n mate beïnvloed wat wissel tussen gering en betekenisvol. Alhoewel die staalveselversterkte blad 16.6% dunner was as die ander blad was die laskapasiteit en defleksiewaardes van die staalveselversterkte blad vergelykbaar met die gewone betonblad (sonder vesels). Daar was geen korrelasie tussen die teoretiese belastings en defleksies en die gemete waardes nie.





## ACKNOWLEDGEMENTS

The author wishes to express his sincere gratitude and appreciation towards **Prof. E.P. Kearsley** for her valuable comments, criticism, encouragement, and guidance. The advice and knowledge provided by **Prof. A. Visser** is also gratefully acknowledged.

A special word of gratitude is extended to:

- The staff at the Civil Engineering Laboratory of the University of Pretoria for practical and administrative assistance.
- The library personnel at the Cement and Concrete Institute and at the University of Pretoria for providing and facilitating access to literature.
- My family for their encouragement, moral support and all sacrifices they made.
- To my creator.





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