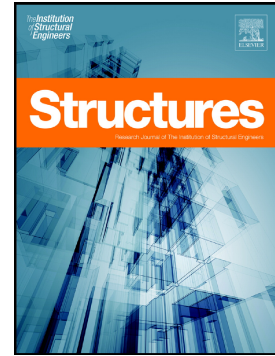


Accepted Manuscript

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PII: S2352-0124(18)30049-3
DOI: doi:[10.1016/j.istruc.2018.05.001](https://doi.org/10.1016/j.istruc.2018.05.001)
Reference: ISTRUC 280
To appear in: *Structures*
Received date: 4 February 2018
Revised date: 30 April 2018
Accepted date: 1 May 2018

Please cite this article as: Rajai Z. Al-Rousan, Mohammad J. Shannag , Shear Repairing and Strengthening of Reinforced Concrete Beams Using SIFCON. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Istruc(2017), doi:[10.1016/j.istruc.2018.05.001](https://doi.org/10.1016/j.istruc.2018.05.001)

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Shear Repairing and Strengthening of Reinforced Concrete Beams Using SIFCON

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Abstract:

The paper deals with the application of Slurry Infiltrated Fiber Concrete (SIFCON) as shear strengthening and repairing materials for normal strength reinforced concrete (RC) beams. The main objective of this study is to develop new and effective construction materials for strengthening of deficient RC beams. The experimental part of the study is divided into three stages. The first stage involved testing of thirteen shear deficient beams under four-point loading as control beams taking into account the effect of shear span-to-effective depth ratio ($a/d = 1.2, 2.2, \text{ and } 3.0$) and amount of longitudinal reinforcement ($\rho = 1.29\%, 1.76\%, \text{ and } 2.28\%$). The second stage involved four shear deficient beams strengthened with SIFCON. For purpose of comparison, two of the tested control beams with a/d of 2.2 and ρ of 1.76% and 2.28% were repaired with SIFCON jacket. The test results indicate that all the beams strengthened with SIFCON jackets displayed an excellent shear capacity. The use of SIFCON jackets as external shear reinforcement eliminated the brittle shear failure and increased the ultimate shear strength of strengthened beams from 37-53%. Therefore, SIFCON jacket can be considered as a promising material for strengthening and repairing of RC structures. Finally, an analytical model was proposed for predicting the shear behavior of the strengthened RC beams with SIFCON Jackets with an acceptable error of less than 30%.

Keywords: Shear; Repairing; Strengthening; Reinforced Concrete; Beams; SIFCON; Analytical Model.

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