

Thesis title:

Investigation on re-cracking behaviour of CFRP strengthened crack stop holes in steel members

Abstract:

The Crack stop hole method is the most popular emergency repairing technique to extend fatigue life of cracked components of steel structure. This method can be introduced as the quickest, simplest and the most economical repairing technique. The process of CSH technique includes fabricating a drill hole at the crack tip, to transfer the crack into a notch. At present the steel bridge repairing industry utilizes this method to stop or delay crack propagations. Originally this technique was successfully applied to the aerospace industry. The CSH method can enhance fatigue life of the cracked structure more than the untreated crack components. However, fatigue damage often occurs at the crack stop hole as such a hole contributes to the structural discontinuity. In the past decades a considerable amount of research has highlighted the capability of delaying crack initiation by CSH technique. However, this technique could be considered as a temporary solution and there have limitation due to geometric constrain and the location of the crack tip. As in some cases it is impossible to drill a hole with a desired diameter as obtained from the design, due to the limited space in the structural element. In this investigation is aimed to investigate the effect of cyclic flexural loads on CFRP strengthen CSH. In addition, this study focuses on estimate and compare average yield strength variation of different hole sizes under three-point cyclic flexural load. Furthermore, expect to develop a model to predict re-cracking behaviour of CSH using FE modelling technique.