Accepted Manuscript

Energy-Based Analytical Formulation for the Prediction of End Debonding in Strengthened Steel Beams

Massimiliano Bocciarelli, Pierluigi Colombi, Giulia Fava, Lisa Sonzogni

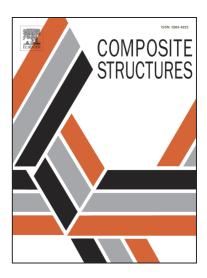
PII: S0263-8223(16)30496-2

DOI: http://dx.doi.org/10.1016/j.compstruct.2016.05.084

Reference: COST 7497

To appear in: Composite Structures

Received Date: 4 May 2016 Accepted Date: 24 May 2016



Please cite this article as: Bocciarelli, M., Colombi, P., Fava, G., Sonzogni, L., Energy-Based Analytical Formulation for the Prediction of End Debonding in Strengthened Steel Beams, *Composite Structures* (2016), doi: http://dx.doi.org/10.1016/j.compstruct.2016.05.084

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

ENERGY-BASED ANALYTICAL FORMULATION FOR THE PREDICTION

OF END DEBONDING IN STRENGTHENED STEEL BEAMS

by Massimiliano Bocciarelli, Pierluigi Colombi^{*}, Giulia Fava and Lisa Sonzogni

Department of Architecture, Built environment and Construction engineering (ABC)

Politecnico di Milano, P.zza L. da Vinci, 32 – 20133 Milan (Italy)

*Contact: e-mail: pierluigi.colombi@polimi.it; phone: +390223994280

ABSTRACT

This paper deals with the evaluation of the edge bond strength of steel beams retrofitted with Fibre

Reinforced Polymer (FRP) materials. Two approaches were mainly investigated, that is the stress-

based criterion and the energy-based one. The latter is simpler since it does not require assessing the

mechanical and geometrical properties of the adhesive layer. The basic concept is that fracture

occurs when the strain energy release rate (SERR) reaches a critical value. Then, a simplified and

general-purpose energy-based analytical formulation is proposed to indirectly estimate the SERR.

Actually, several linear and non-linear methods allow analysing the end debonding failure.

However, such models are often difficult to develop, not immediate and a considerable calculation

effort is needed. Therefore, the formulation discussed in this paper was proposed for being

straightforwardly applied in the design phase of reinforced steel beams under general loading

configurations and static schemes. To validate the analytical approach, experimental results for a

simply supported beam are considered. A parametric analysis is also performed and the results are

compared to the ones of a recently proposed numerical method. A good agreement among the

experimental, analytical and numerical models was found in all the cases, showing the potentialities

of the proposed approach.

Keywords: FRP materials, bond strength, interfacial crack model, fracture energy, steel beams

1

Download English Version:

https://daneshyari.com/en/article/6705202

Download Persian Version:

https://daneshyari.com/article/6705202

<u>Daneshyari.com</u>