Accepted Manuscript

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Daniel D. Estep, Hota V.S. GangaRao, David B. Dittenber, Asif Qureshi

PII: S1359-8368(15)00676-9

DOI: 10.1016/j.compositesb.2015.11.008

Reference: JCOMB 3882

To appear in: *Composites Part B*

Received Date: 10 June 2014

Revised Date: 4 November 2015

Accepted Date: 7 November 2015

Please cite this article as: Estep DD, GangaRao HVS, Dittenber DB, Qureshi A, Response of pultruded glass composite box beams under bending and shear, *Composites Part B* (2015), doi: 10.1016/j.compositesb.2015.11.008.

RESPONSE OF PULTRUDED GLASS COMPOSITE BOX BEAMS UNDER BENDING AND SHEAR

Daniel D. Estep[a]*, Hota V.S. GangaRao[b], David B. Dittenber[c], and Asif Qureshi[b]

[a]Constructed Facilities Center, Department of Civil and Environmental Engineering, West Virginia University, P.O. Box 6103, Morgantown, WV, USA, 26506-6103; PH (304) 312-7258; email: destep3@mix.wvu.edu
[b]Constructed Facilities Center, Department of Civil and Environmental Engineering, West Virginia University, P.O. Box 6103, Morgantown, WV, USA 26506-6103; PH (304) 293-9986; email: Hota.Gangarao@mail.wvu.edu
[c] *Present Address:* School of Engineering and Engineering Technology, LeTourneau University, P.O. Box 7001, Longview, TX, USA, 75607-7001; PH (903) 233-3900; email: daviddittenber@letu.edu
* Corresponding author

ABSTRACT

Existing failure load prediction models for pultruded FRP box beams are inaccurate when compared to experimental evaluations provided herein by the authors. This inaccuracy is attributed to improper identification of failure modes based on beam span-to-depth ratios and principal strain resulting in premature failure compared to elastic bending stress-based failures. Inclusion of stress intensity factors and computation of stress concentrations aids in consistently accurate results compared with experimental data. The proposed equations are predicting critical flexural load capacities within ±22% of experimental data for all cases. The failure model in tension is the most accurate one, while local buckling predictions in compression need further refinement.

Keywords: fiber-reinforced polymer (FRP); glass fibers; mechanical testing; pultrusion; stress concentrations