



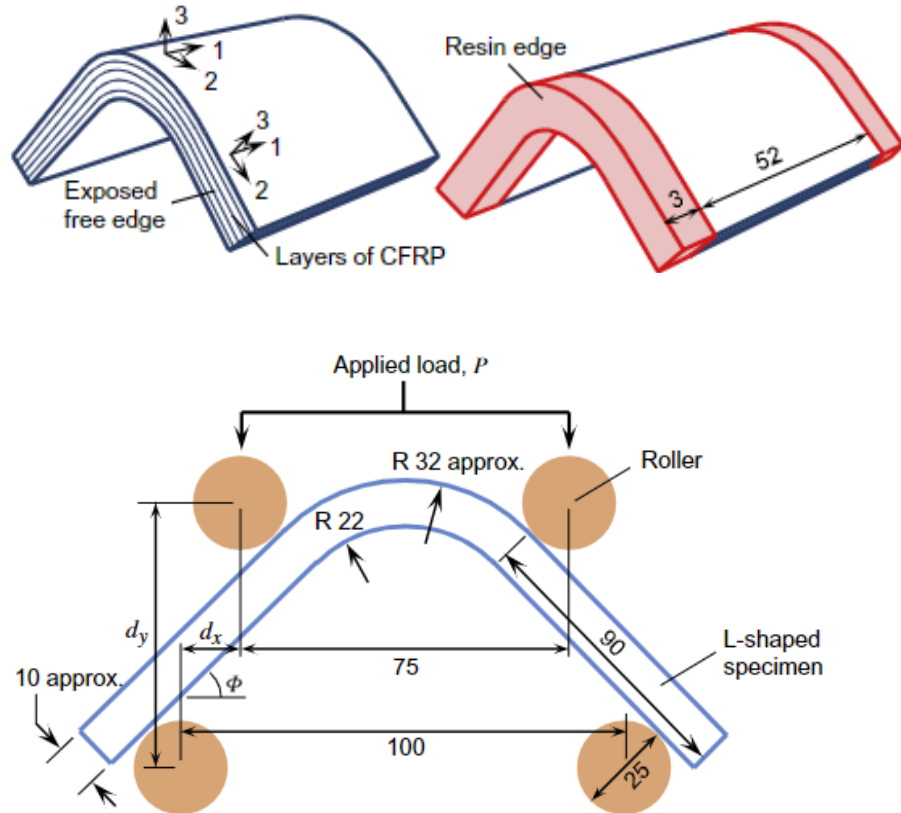
UNIVERSITY OF  
**BATH**

# **The Influence of Edge Delamination on Coupon Strength Tests**

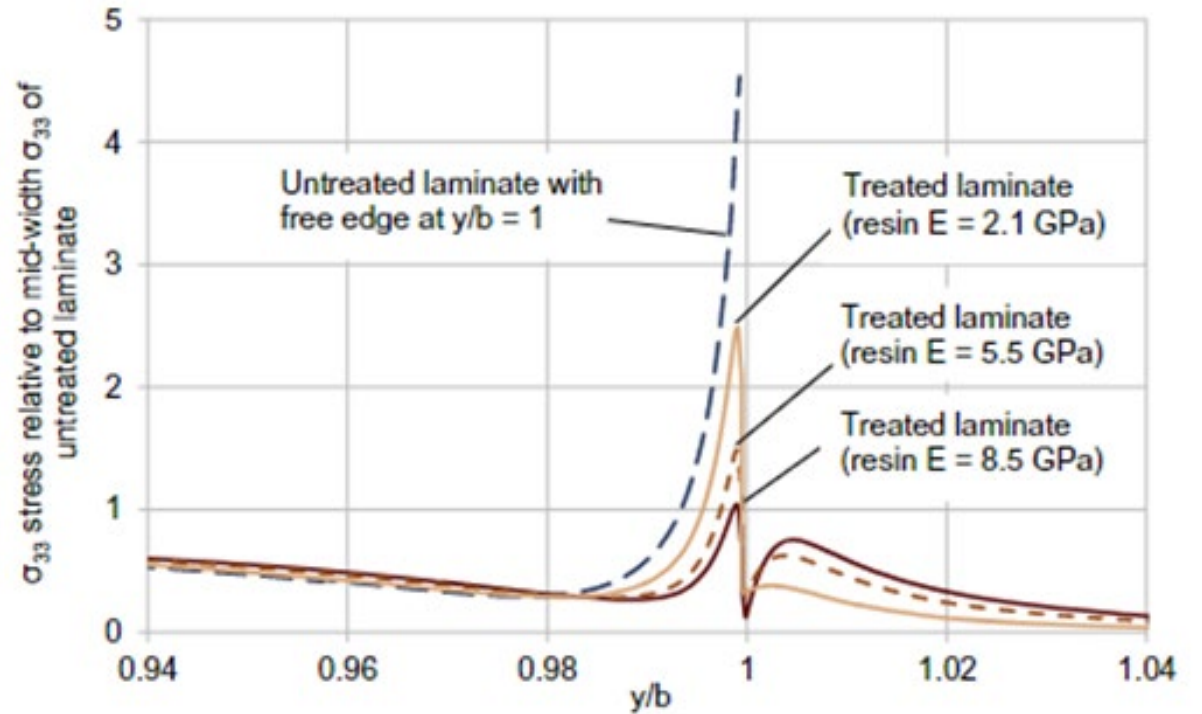
28<sup>th</sup> March 2023

Richard Butler

# Edge treatment of Corner Bend specimens\*



Interlaminar tensile stress between 0/90 plies closest to inner radius



Edge treatment - improved test reliability  
 enabled mesh convergence  
 increased test strength (by 16%)

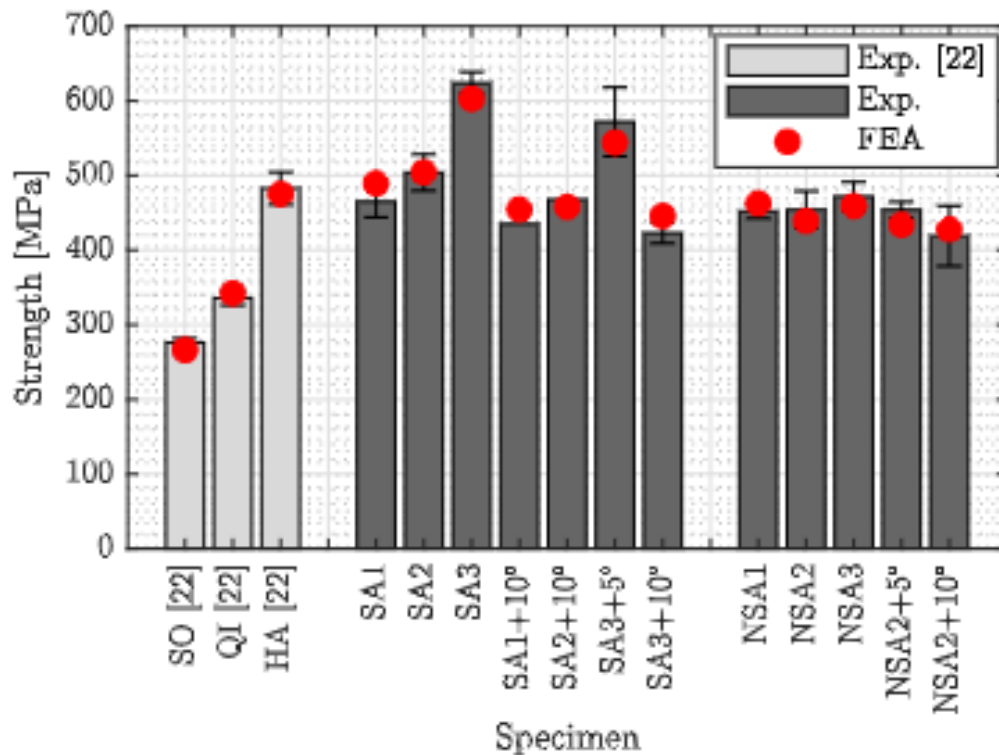
\*Fletcher et al, Composite Structures, 2016

# Open Hole Tension – FEA Validation\*

50/40/10 (0/±45/90) Standard Angle laminate

60/40 (±10/±57) Non-Standard Angle laminate

Equivalent in-plane stiffness (skin laminate)

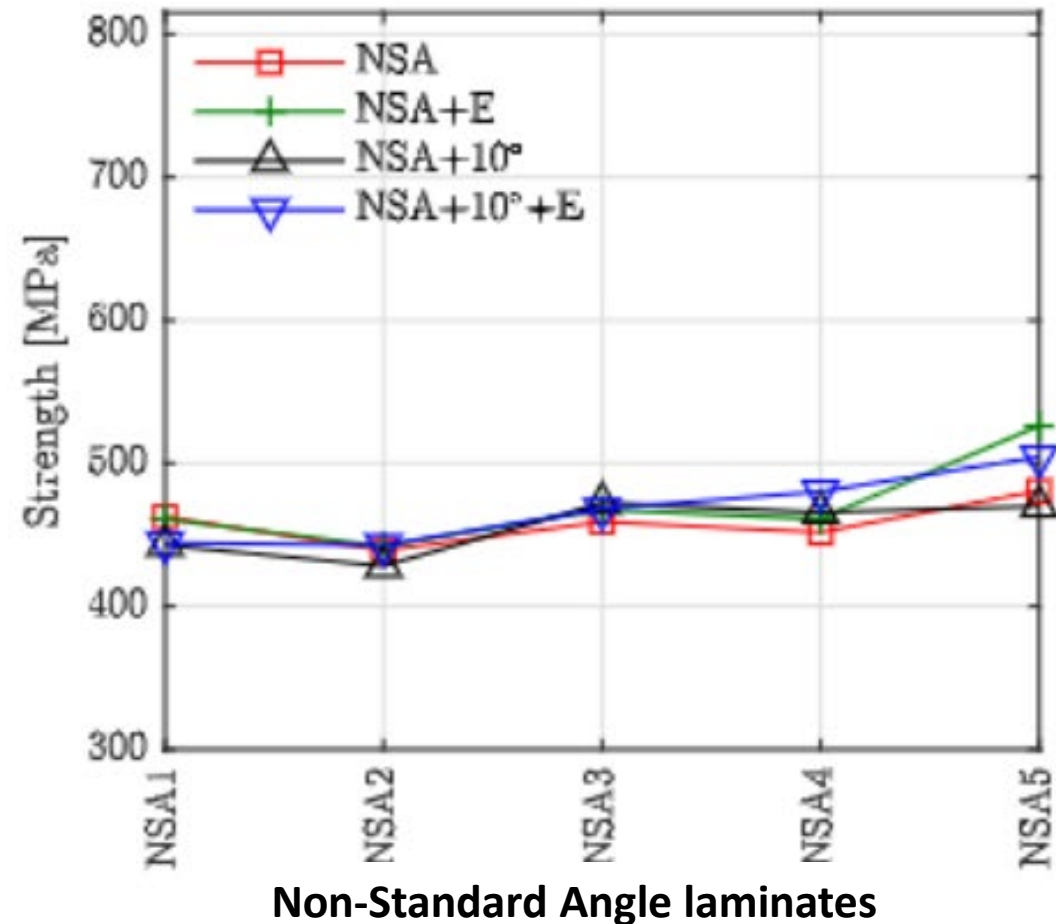
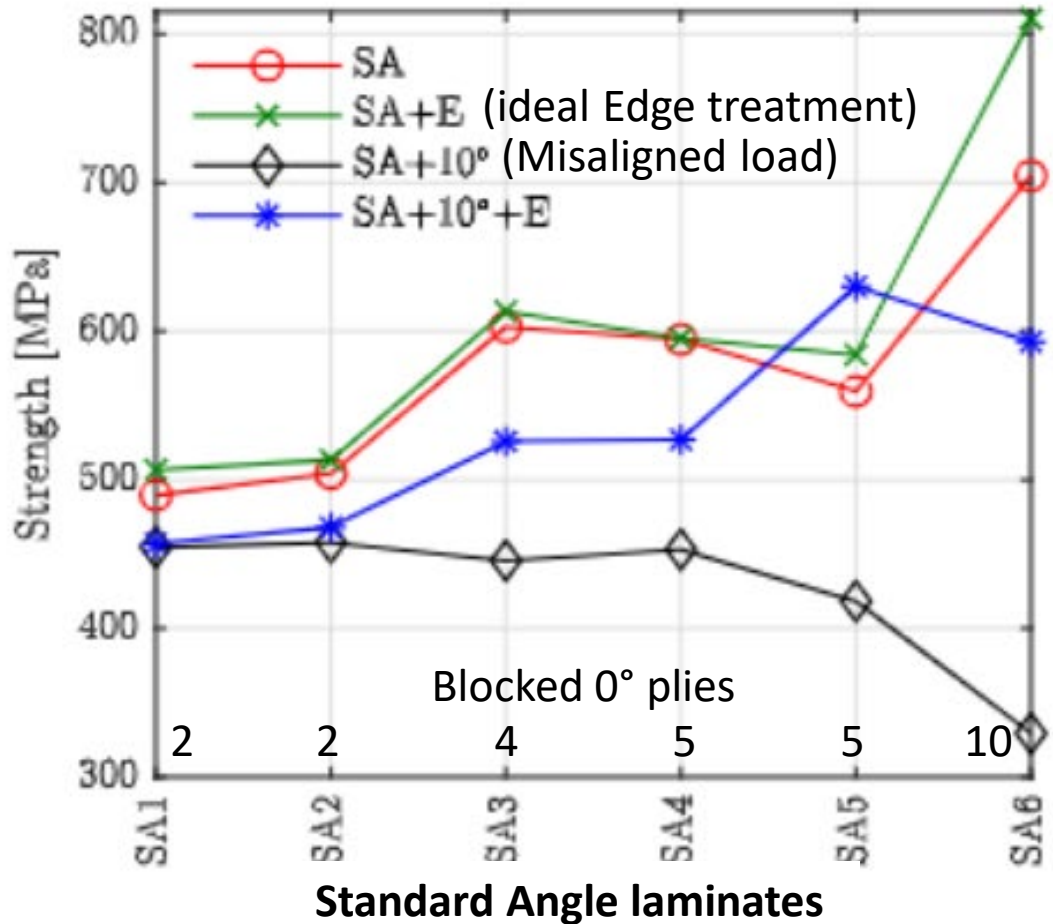


- [22] = Falco et al., Compos Struct, 2018.
- SA1; SA2 two blocked 0° plies
- SA3; four blocked 0° plies
- +10° = tension applied with 10° misalignment

(a) Experimental vs FE predicted OHT strengths

\*Chuaqui et al, Composites B, 2021

# Open Hole Tension – Laminate Design\*



- Edge treatment enables strength levels approaching UD strength
- Shear load (misaligned tension) reduces strength by up to 60%
- Up to 50% recovery with edge treatment
- Non-standard angles less optimal but insensitive to misalignment and edge treatment

\*Chuaqui et al, Composites B, 2021

# Conclusions

- Edge treatment increases coupon strength significantly (16% CBS test; 50% OHT model; 36% SBS test)
- Coupon tests can be flawed when assessing wide part strength
- Realistic assessment of in-situ strength is critical for optimised performance (e.g. CerTest, see [composites-certtest.com](http://composites-certtest.com))



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