



Bristol Composites Institute

# An Investigation into the performance of Aligned Discontinuous Fibre Reinforced Composites (ADFRC) produced with HiPerDiF 3G

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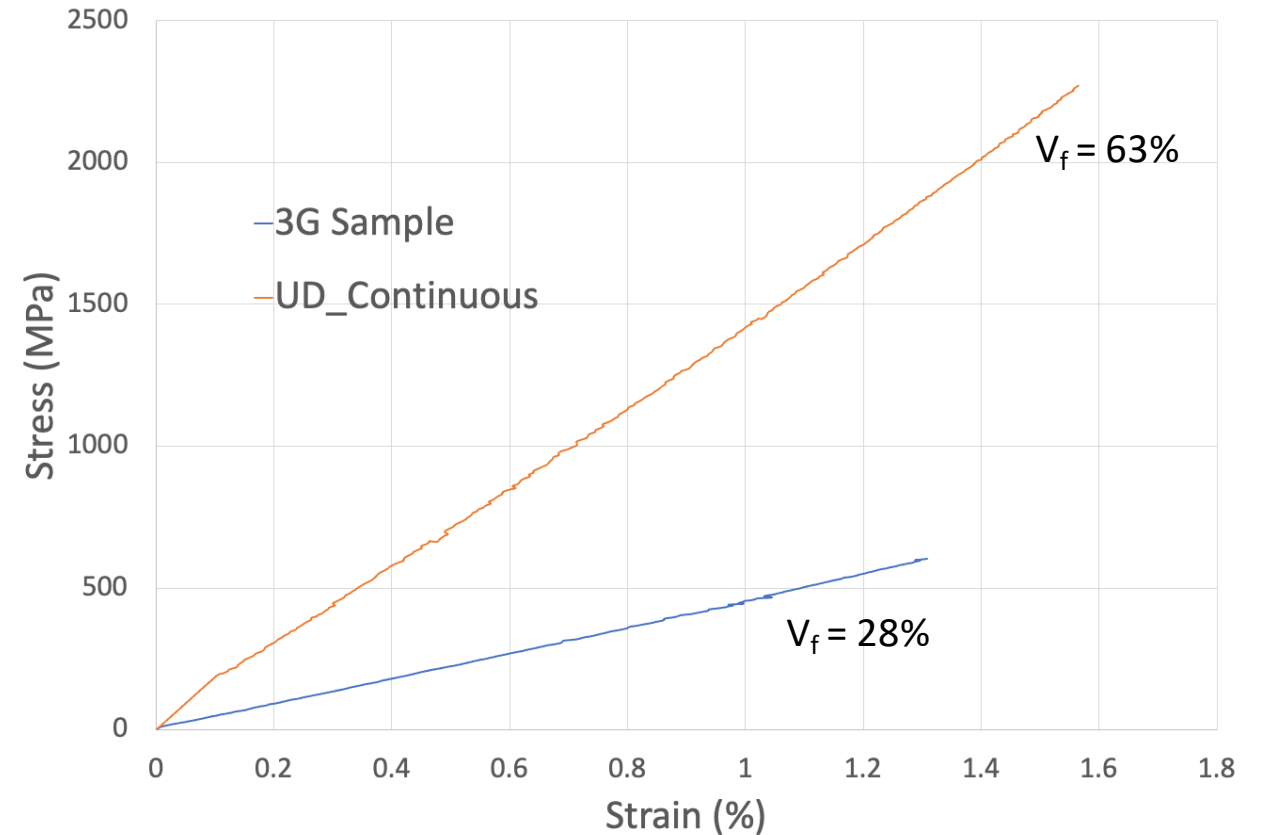
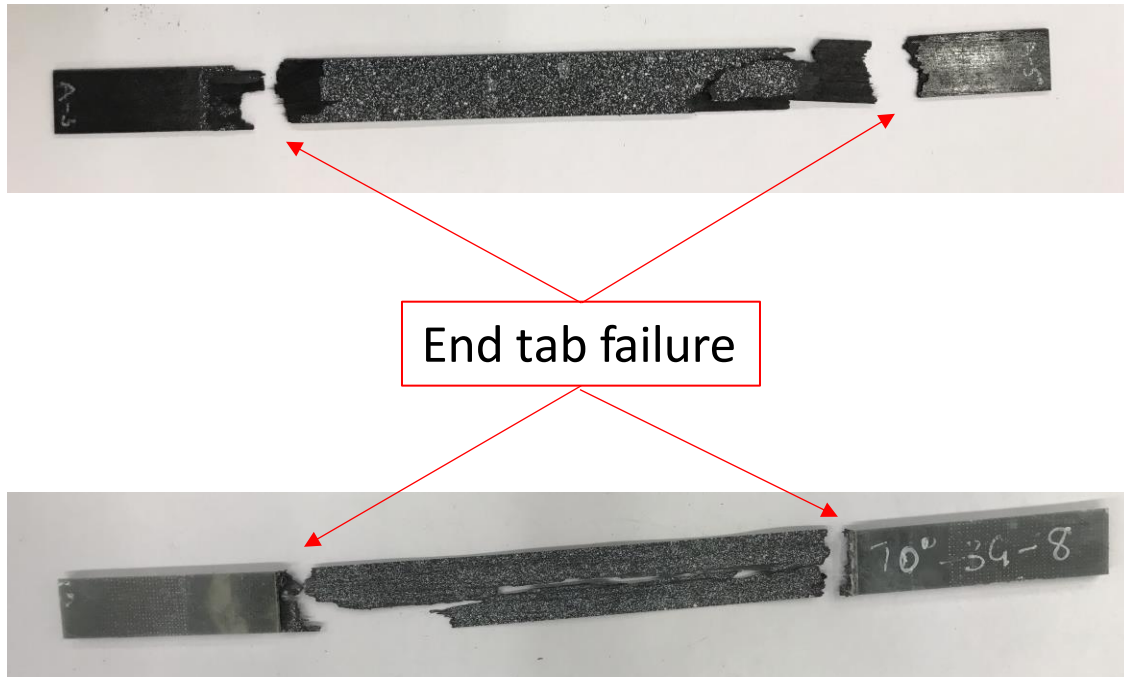


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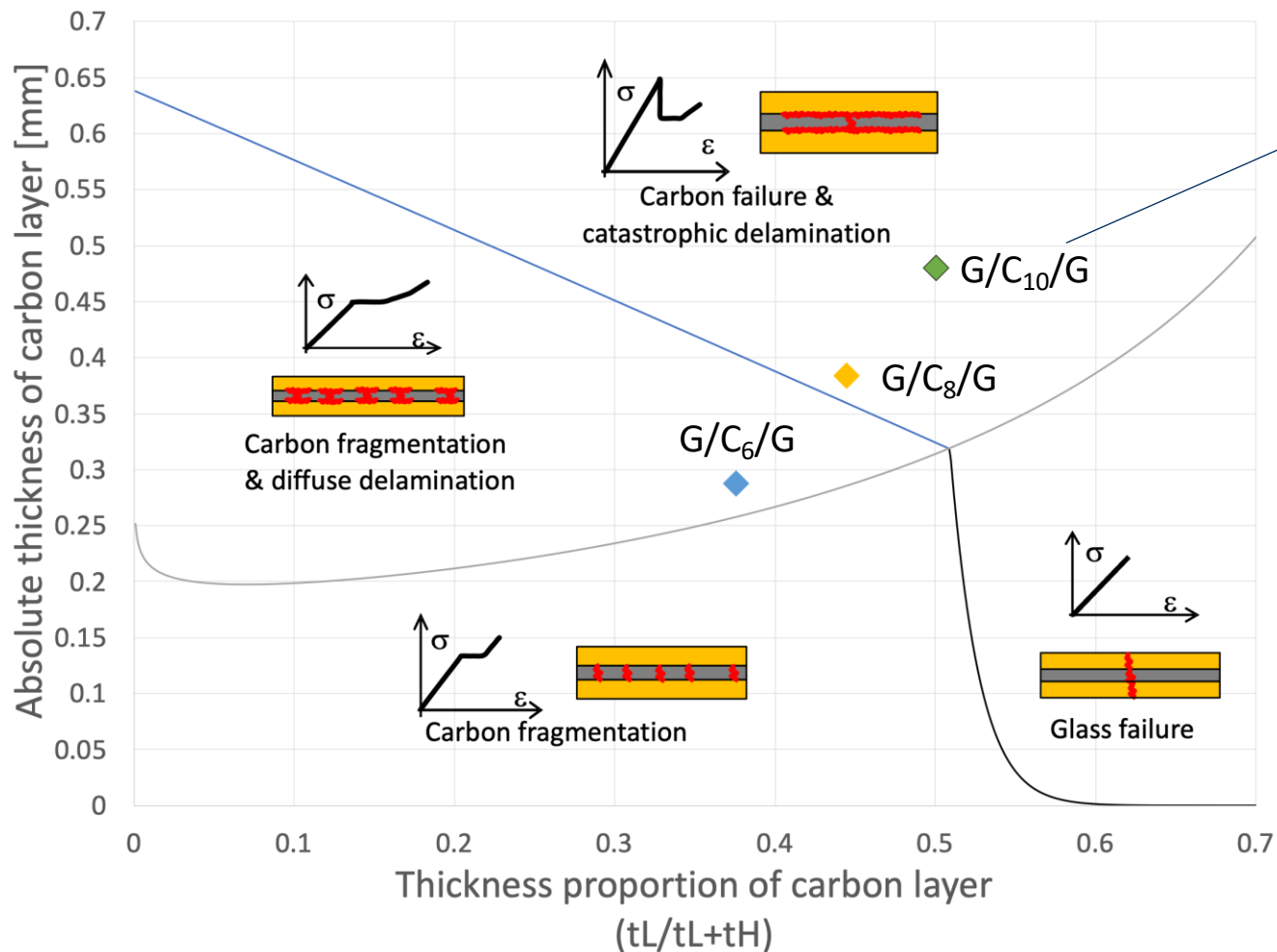
# The problem

- End tab failure of 0° 3G ADFRC = Low confidence in failure strain



Representative stress-strain curve - 3G ADFRC sample vs UD Continuous

# Methodology



Damage mode map of interlaminated hybrid specimen



Low strain material – 3G ADFRC carbon

High strain material - glass

- Using thin ply interlaminated hybrid specimen to identify failure strain (1)
- Stiffness and Strength of carbon & glass used to create damage mode map
- Altering the absolute and relative thickness controls the failure behaviour
- Desired failure mode = Carbon layer failure and catastrophic delamination

# Results



Section of non-hybrid 3G ADFRC sample



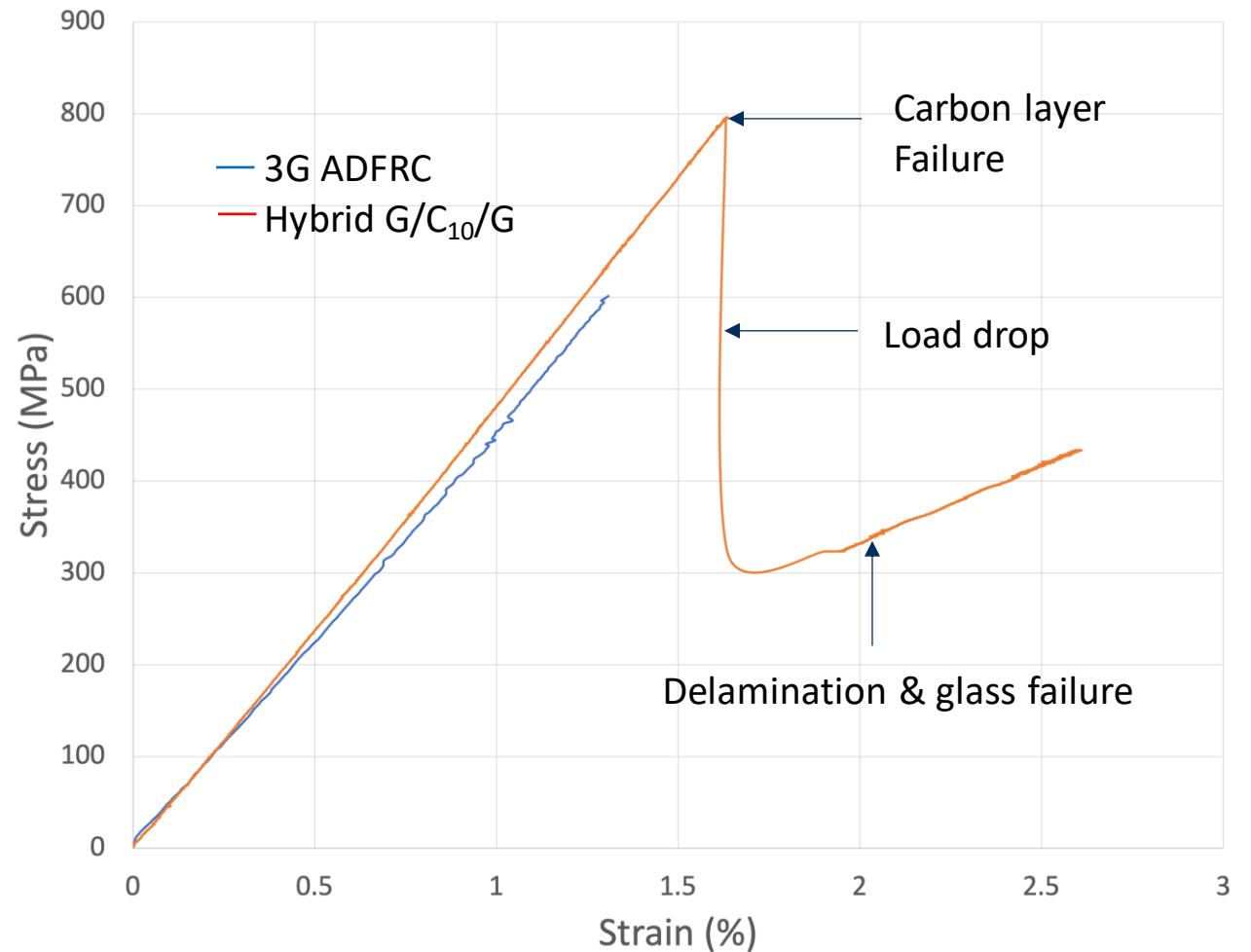
G/C<sub>10</sub>/G Hybrid sample before testing



Hybrid sample after tensile test

Carbon layer failure

White of glass layer indicating catastrophic delamination

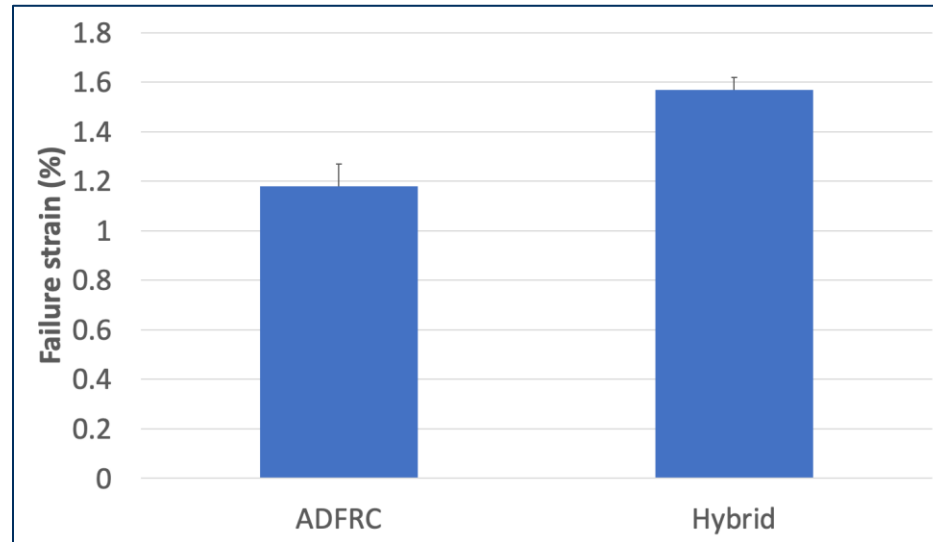


Representative stress-strain curve - 3G ADFRC non-Hybrid vs Hybrid sample

# Conclusions & Future work


## • Conclusions

- Using interlaminated hybrid specimen identified failure strain with higher confidence



## • Future work

- Apply same methodology to the characterisation of other specimen types:
  - UD-Continuous prepreg
  - 3G ADFRC with 6mm fibres

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- <https://www.compositesworld.com/articles/high-performance-sustainability-and-cost-efficiency-advance-with-hiperdif>
  - [https://www.compositimagazine.it/sfoggia-la-rivista/compositi-2022/?utm\\_source=dem&utm\\_medium=cover-pulsante&utm\\_campaign=COMmarzo63online](https://www.compositimagazine.it/sfoggia-la-rivista/compositi-2022/?utm_source=dem&utm_medium=cover-pulsante&utm_campaign=COMmarzo63online)

# Thank you for listening

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