Jenny Banks

Prof. Steve Eichhorn[2], Dr. Kyle Pender[1],
Dr. Jemma Rowlandson[2] Dr. Tim Young[1]

National Composites Centre[1]
University of Bristol[2]

Maximising the performance potential of continuous recycled carbon fibre

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Why continuous recycled carbon fibre?

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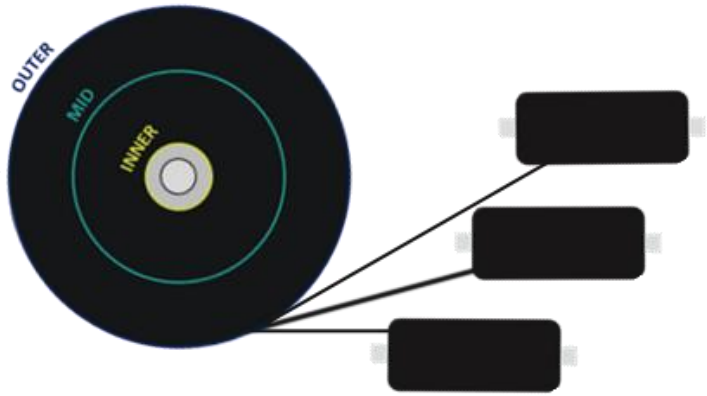
EOL SOURCES OF CONTINUOUS



FILAMENT WOUND PRODUCTS

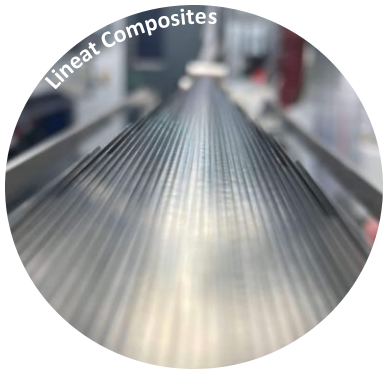
EOL SOURCES OF DISCONTINUOUS

WOVENS

UD/NCFs

CHOPPED PARTS

RANDOM



ALIGNED

Pressure vessels will account for ~15% of global carbon fibre demand in 2025 [1,2]

[1] Statista, 2024, "Global carbon fiber demand from 2016 to 2025, by market" [online]
[2] CompositesWorld, 2024, "Composites end markets: Pressure vessels (2024)" [online]

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Why continuous recycled carbon fibre?

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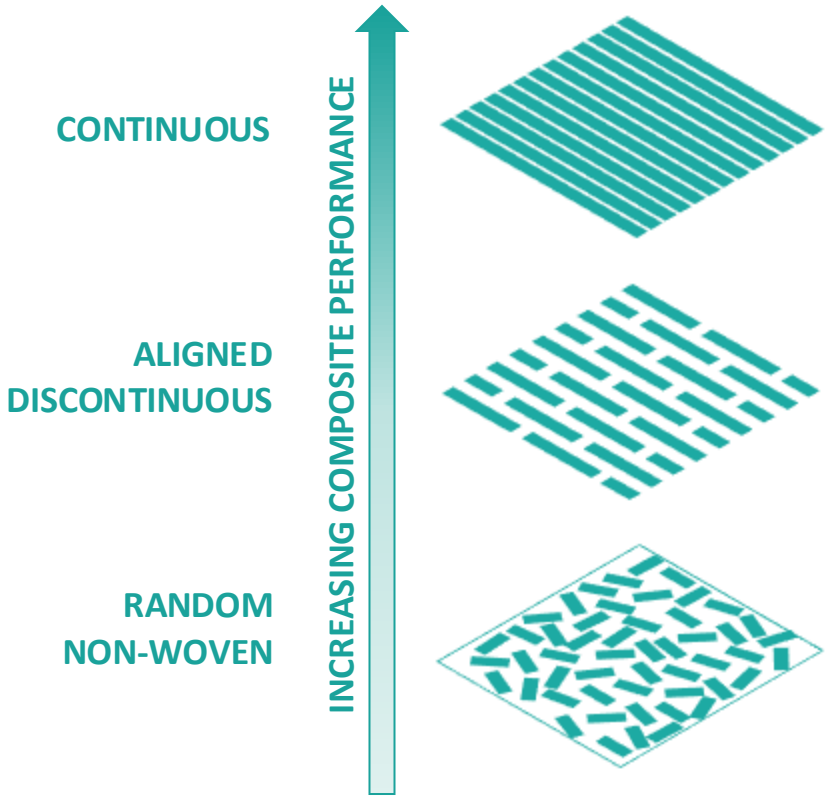

Continuous CF recovery offers:

- **Potential to retain maximum performance** for rCF materials
- An opportunity to understand how rCF surface character and fibre-matrix interface influences **performance of all rCFRP types.**

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Tracking fibre performance throughout the tow-to-preform conversion process

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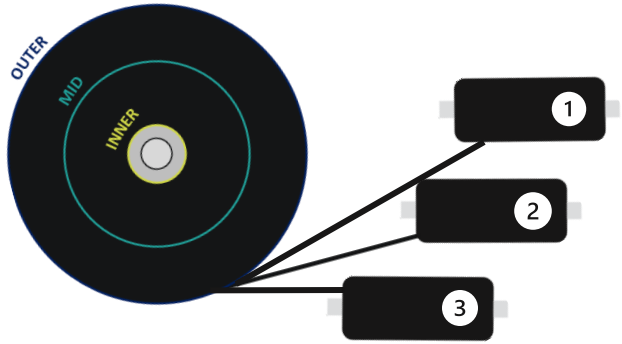
RECLAMATION



TANK UNWINDING

- CHAR REMOVAL
- FIBRE SURFACE TREATMENT
- TOW SPREADING
- TOW SIZING
- PREFORM MANUFACTURE
- COMPOSITE MANUFACTURE
- COMPOSITE PERFORMANCE
  mechanical + interfacial

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The benefits and challenges of fibre surface char

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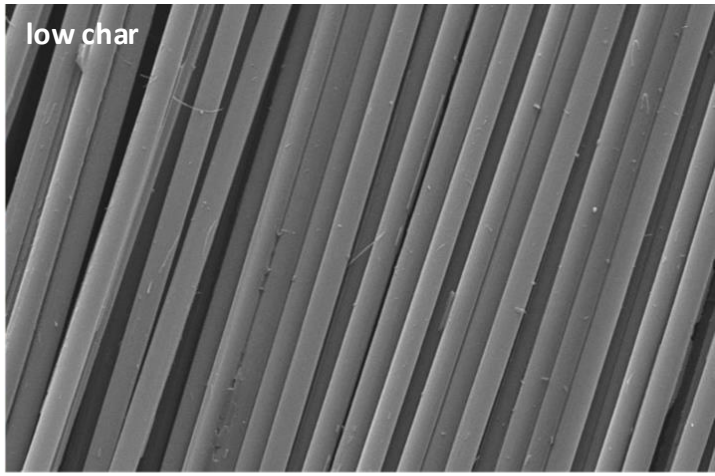
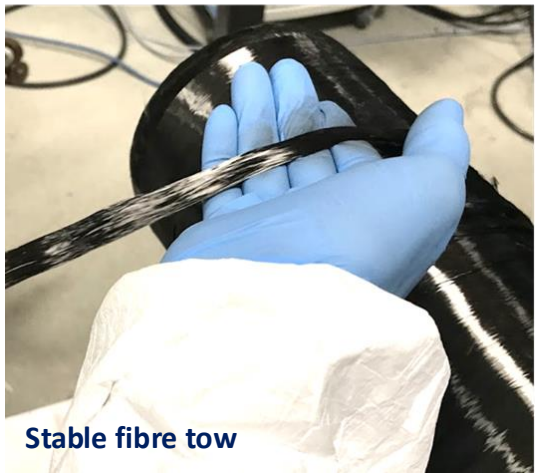
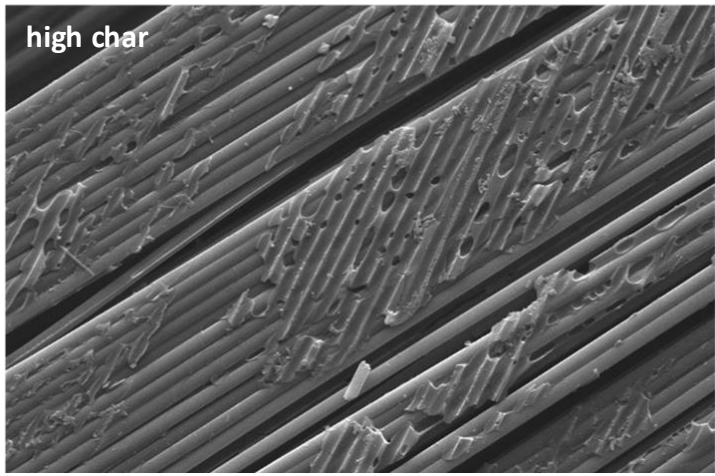
Char provides tow integrity during unwinding

vs.

Char variability along the tow translates to variable "starting condition" for down-stream processing







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Preliminary results from our rCF char removal study

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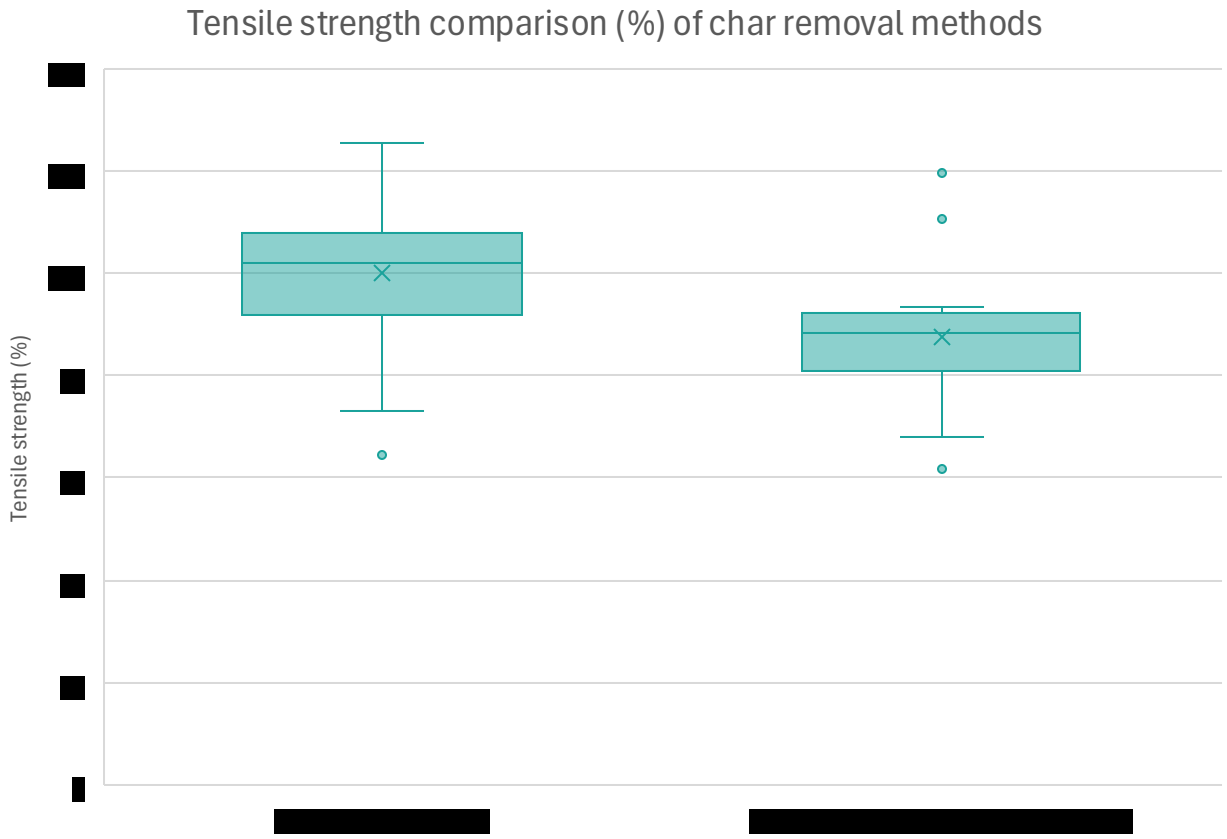
- A broad range of single fibre tensile strength values (0-50% of virgin) observed for rCF before treatment
- rCF can perform as virgin at the single fibre level
- Electrochemical, thermal and acid char removal treatments compared
- No statistical difference in single fibre tensile strength for pre- and post- treated rCF (electrochemical)



NPL National Physical Laboratory

HENRY ROYCE INSTITUTE

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What's next?

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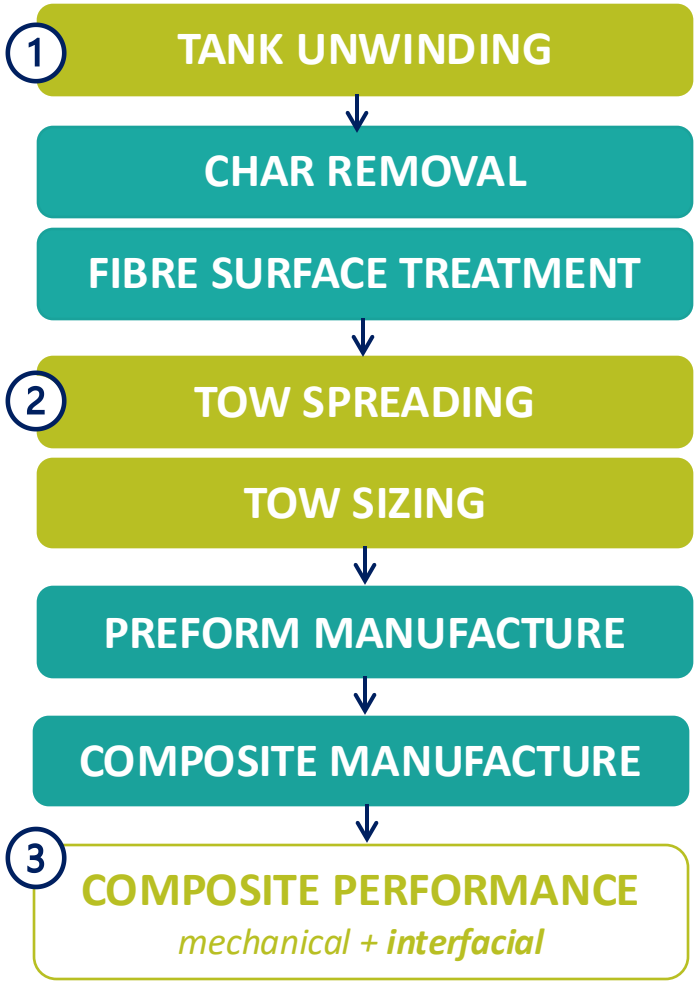
1. **DIAGNOSE**
   Is fibre performance variability introduced during tank unwinding?

2. **MANUFACTURE**
   How do we spread unsized rCF tows? Is sizing needed to mitigate fibre damage?

3. **CHARACTERISE**
   What effect does char removal treatment have on fibre-matrix interface/phase?



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Thank you!
Any questions?

jenny.banks@nccuk.com
jenny.banks@bristol.ac.uk

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