IN-SITU CONSOLIDATION (IC) IN LASER-ASSISTED AUTOMATED FIBRE PLACEMENT (LATP) OF CARBON FIBRE REINFORCED THERMOPLASTICS (CFTP)

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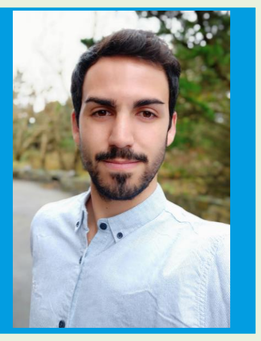
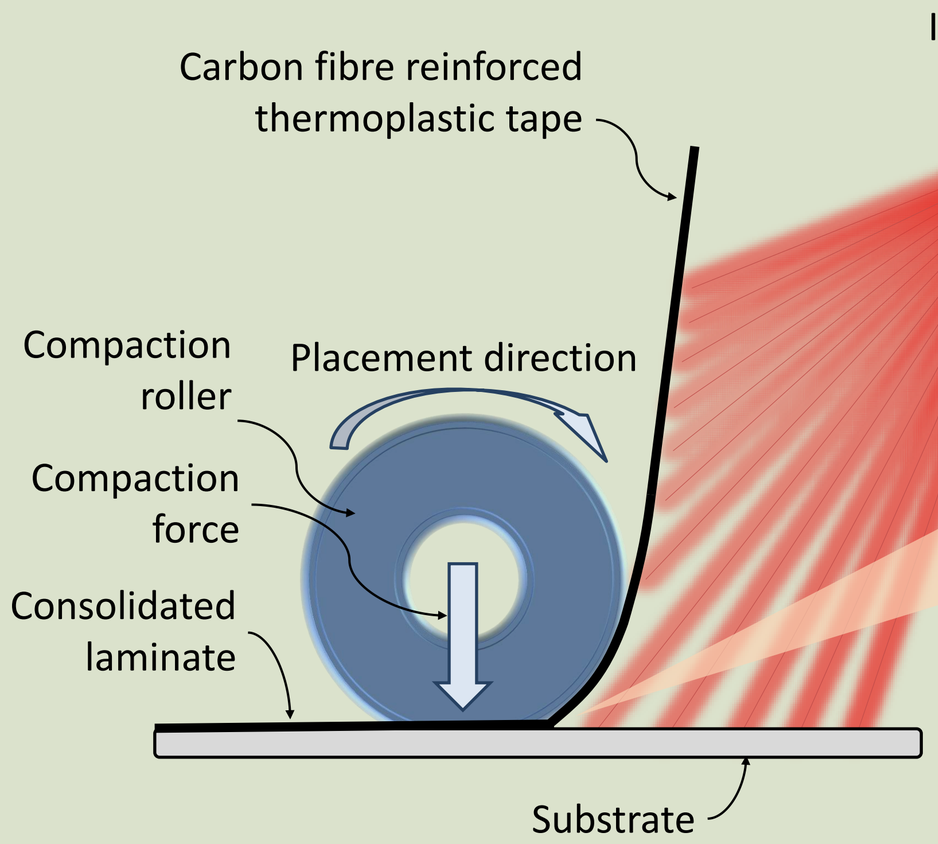
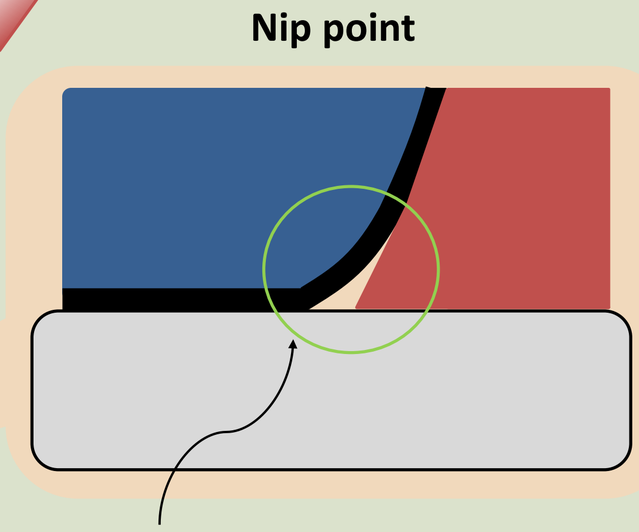


LATP-CFTP BASIC COMPONENTS





Typical high placement speed processing conditions

Laser power: > 2 kW
Heating time: < 500 ms
Heating rate: > 1000 °C/s
Compaction time: < 100 ms
Cooling rate: > 10 °C/s

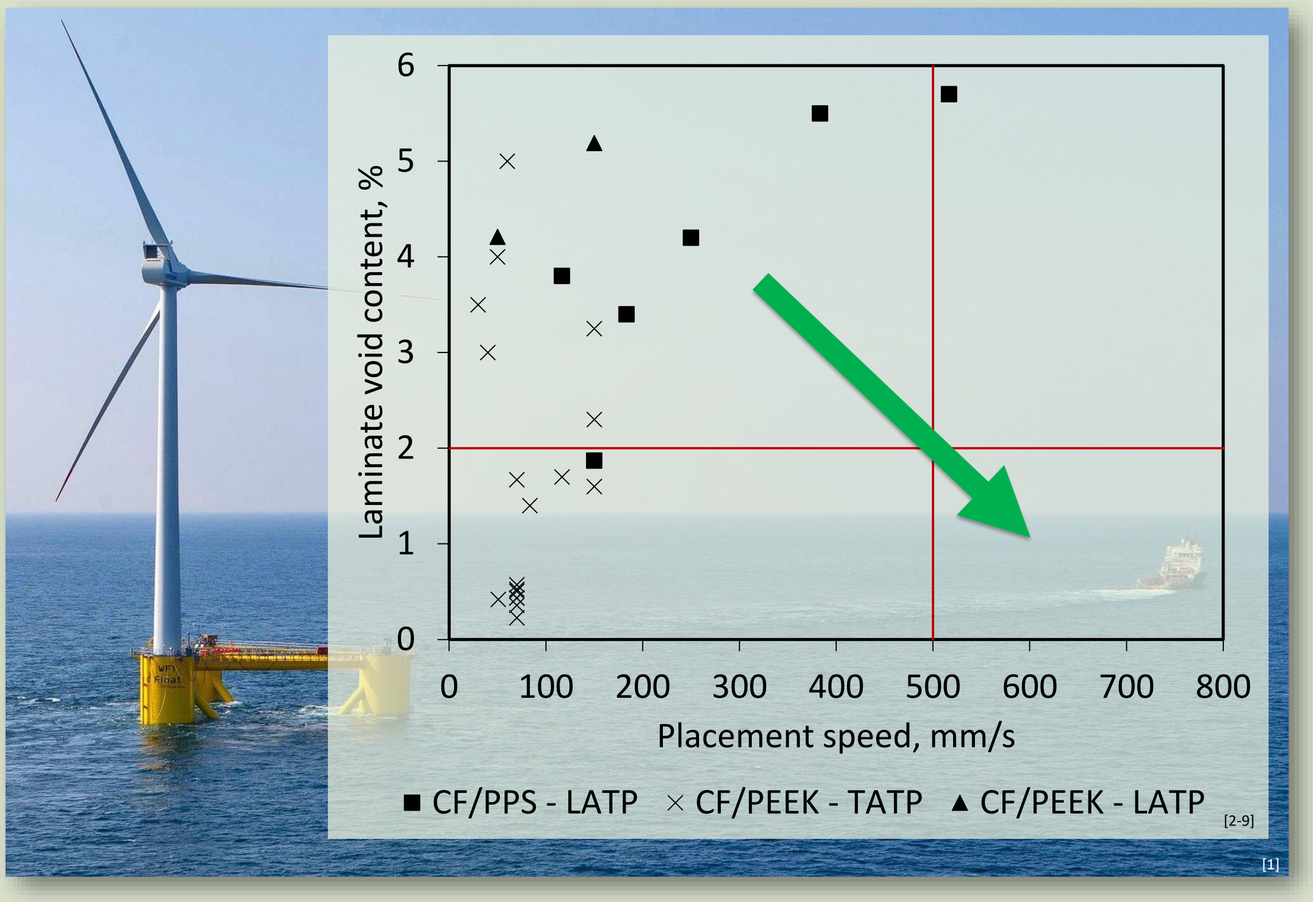
LATP-CFTP PROS, CONS AND CHALLENGES

CFTP

✓In-situ consolidation
✓ Weldable
✓ Infinite shelf-life
✓ Recyclability
✗Expensive

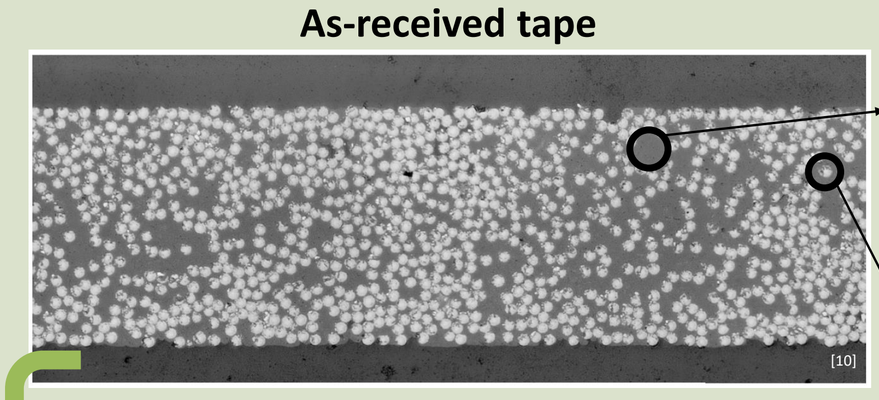
LATP

✓ One-step manufacturing
✓ High degree of automation
✓ Layup optimisation
✓ Robustness
✓ Minimise scrap
✗ Laminate quality

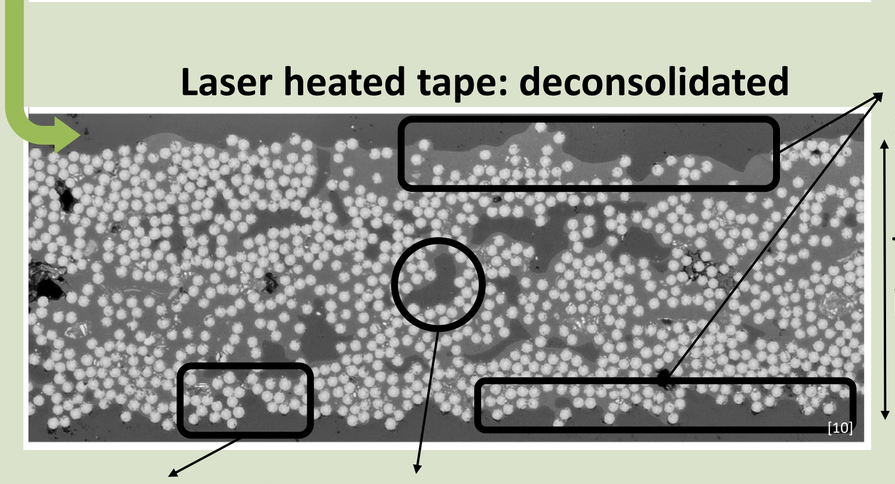


LACK OF IN-SITU CONSOLIDATION. CAUSES AND POSSIBLE SOLUTIONS

As-received tape

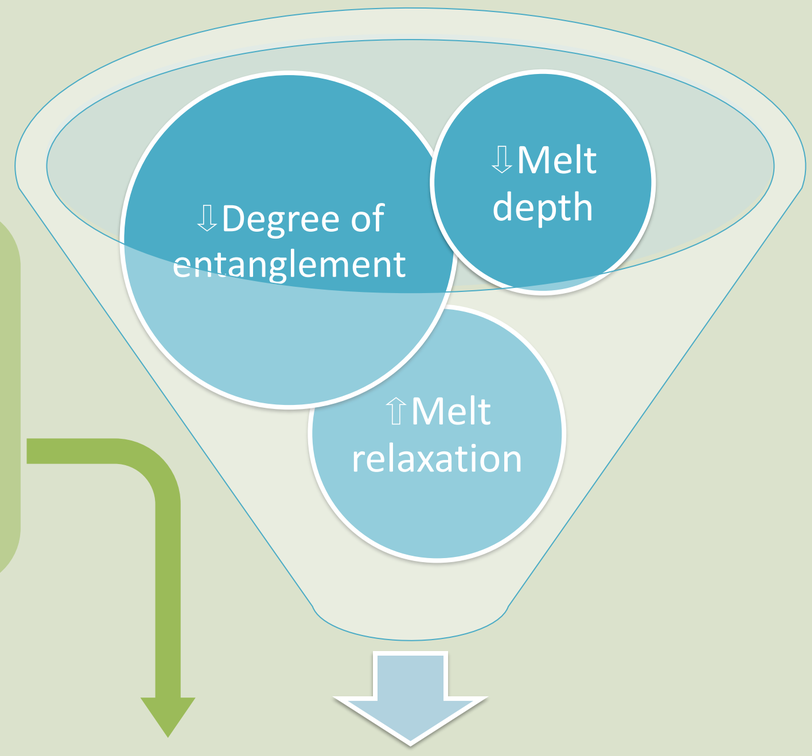


Laser heated tape: deconsolidated



Intimate contact between tape and substrate hindered due to deconsolidation and short processing times

Strategies to improve IC



Minimise deconsolidation
Improve matrix percolation

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