

## Towards a reliable-based design of pultruded GFRP structures: from material characterisation to mechanical connections

### Summary

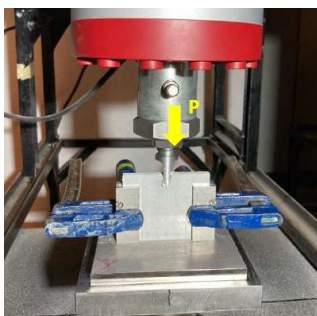
In the development of the recent European Technical Specification for the design of fibre reinforced polymer (FRP) structures (CEN/TS 19101:2022), two main challenges were identified: the limited understanding of the variability of FRP mechanical properties; and the lack of reliability-grounded design formulae for some resistance models, namely for bolted and bonded connections, which often govern the design of FRP structures.

This work will address those challenges by: (i) developing a database of test results of material properties and connections; (ii) conducting a large-scale experimental programme, comprising mechanical characterization tests in a wide range of FRP materials, and tests in bolted and bonded connections with different configurations; (iii) reliability analysis and calibration of design equations, including the derivation of partial factors for resistance models.

These results will improve the design guidance provided in CEN/TS 19101 (partly based on engineering judgement) and is expected to be included in the future Eurocode for FRP structures.

### Keywords

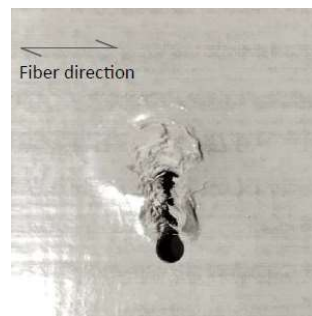
FRP structures, bolted and bonded connections, variability of mechanical properties, uncertainty of resistance models, reliability analysis, design guidance.



(a)



(b)



(c)

GFRP bolted connections:

(a) pin-bearing test; (b) Single-bolted connection test; (c) Bearing failure mode.



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#### Period

2023-2026

#### Funding

FCT scholarship (BD.2023.00467)