Researchers Professor Alessandro Palermo and post-grad student Cain Stratford (left) are investigating how GFRP bars may be used in reinforced-concrete bridge columns | Photo source University of Canterbury

GLASS-FIBRE BARS COULD HELP REPLACE AGEING CONCRETE INFRASTRUCTURE

PROPERTY & CONSTRUCTION

Researchers in New Zealand are testing out the use of glass fibre to reinforce polymer bars in structural engineering

Spotted: Reinforced concrete is susceptible to corrosion from seawater. This is a real problem in New Zealand, where much of the reinforced-concrete infrastructure is located close to the coast. This is why a team at the University of Canterbury (UC), led by Structural Engineering Professor Alessandro Palermo, has proposed the country look into alternatives.

Their research highlighted the need for a more sustainable approach to the repair and replacement of ageing infrastructure. One option being investigated by researchers is the use of Glass Fibre-Reinforced Polymer (GFRP) bars in place of steel reinforcement bars. The UC team focused on studying the seismic performance of GFRP rebar.

The GFRP bars have higher tensile strength than steel with only a quarter of the weight and are corrosion-resistant. This can help structures to have a longer useful lifespan, as well as offering "sufficient seismic performance". The team is currently studying how they can be used to reduce maintenance costs and increase structural life-cycles.

Canterbury PhD student Cain Stratford discussed an experiment designed to measure the impact of loading on the GFRP bars. He said: "Construction of the columns was made noticeably easier by the lightweight nature of the GFRP bars ... Initial results from our tests have shown that a combination of GFRP bars with conventional steel can be an optimum choice to guarantee both excellent seismic performance and an increase in the usable life of the structure."

Sustainability in construction is becoming vitally important and architects and structural engineers are rising to the challenge. Recent innovations in this space include flat-pack tiny homes and 3D-printed construction components.

Written By: Lisa Magloff

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Email: alessandro.palermo@canterbury.ac.nz
Website: canterbury.ac.nz

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Takeaway:

Professor Palermo hopes that the outcome of the study will result in a design shift in the field of structural engineering, allowing the creation of more sustainable architecture. Other researchers have demonstrated that GFRP rebars can maintain more than 97 per cent of their strength, with no sign of corrosion over 15-20 years. Together with the UC research, there could be a significant future for GFRP bars in structural engineering application. Further research may well demonstrate other structures that could benefit from GFRP bars too.