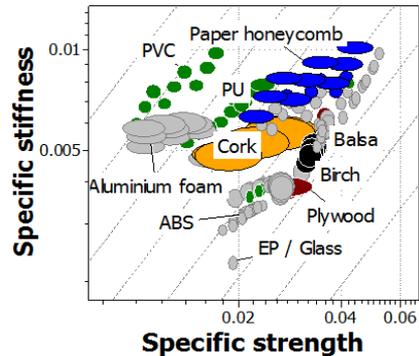


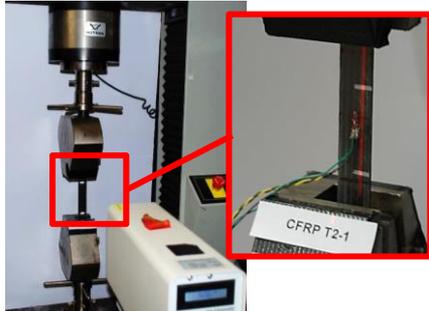
Level | PGR



GFRP sandwich panel roof structure – Yitzhak Rabin Center (2005)



Material selection: strength vs. stiffness for core materials with quasi-orthotropic glass-epoxy face sheets



4PB testing on CFRP sandwich panels.

FRP-based high-performance building envelopes

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Overview | Geometrically complex building envelopes are typical in contemporary architecture. The conventional approach during their design is to provide a succession of layers in the build-up, each one addressing a particular requirement (thermal, structural, water tightness etc.). This approach often becomes problematic and costly in geometrically complex envelopes. Sandwich panels consisting of Fibre reinforced Polymers (FRP) face sheets bonded to lightweight cores have successfully been used in aerospace and marine industries. Thus, FRP panels can potentially provide an integrated, loadbearing and lightweight solution for geometrically complex building envelopes.

The design of the limited number of FRP facades to-date tends to be bespoke and involves costly and time-consuming prototype testing. This research project aims to establish a design method for FRP sandwich panels in façade applications ultimately enabling a more widespread use in façades.

Outcomes and Impact | The aim of the project is to determine unknown long-term behaviour of FRP sandwich panels subjected to façade-like weathering conditions. The practical advantage of this research will be to produce a clear relationship between the environmental ageing and mechanical degradation. The focus will be on delamination behaviour under ramp, static and fatigue loading conditions and will establish reliable design values that can be used by engineers and that can be adapted for different real-world case studies. Ultimately the evaluation of the durability of FRP sandwich panels in this project will determine its suitability and reliability for use in structural façade applications and will ensure its efficient long term performance.

Work Involved | The project will focus on the following stages:

- Establishing a façade-like weathering program to replicate artificially long-term ageing of FRP sandwich panels
- Investigating the mechanical behaviour after artificial ageing with numerical models and experimental testing for validation of the results. Empirical and analytical models will be developed in parallel for predicting the structural performance of these units.