

ArmaPET® Insights LONG-TERM PERFORMANCE

When it comes to sandwich systems, long-term performance is key for many industries, from wind energy, transport and general industry through to building and construction. Armacell's ArmaPET product portfolio provides solutions for sandwich constructions that are not only sustainable – since they are based on 100% recycled material and are 100% recyclable – but also capable of ensuring long-term performance for end-users.

Armacell has carried out extensive testing to verify that ArmaPET core will have an extremely long lifetime in the composite sandwich end-product. The tests carried out include:

- // **4-POINT BENDING FATIGUE** testing that confirms a **fatigue threshold of 60 % after 5 million** cycles as per the DnV certification for wind turbines that simulates 25 years in service.
- // **THERMAL STABILITY** testing **up to +180°C / 356°F** for a limited time (hours) and +150°C / 302°F for an extended period (weeks) without any degrading of the material properties. This provides security in the case of extended in-service use and elevated processing temperatures.
- // **HOT WET ACCELERATED AGING** test according to aerospace standards, to simulate in-use cyclic loading over a **25-year life span**.
- // **CHEMICAL RESISTANCE** testing with most common solvents, to provide guidance on safe and reliable use and resistance after processing.
- // **UV STABILITY** testing on plain sheet material over a period of months in direct sunlight showed no degradation of the mechanical properties.
- // **CREEP** testing, to simulate static loads over an extended life span.

All the tests indicate that there is no general aging or degradation of the material over time and therefore sandwich structures can be expected to maintain long-term performance. This can be further substantiated with the trust of our customers: today, ArmaPET Struct core material is used in more than 135 000 wind turbine blades, which are designed for an expected lifetime of more than 25 years. Furthermore, ArmaPET is a trusted solution in the transport industry, in rail applications, trucks, boats and RVs that are designed for a long lifespan, as well as in infrastructure applications with an expected lifetime of 25 to 50 years.

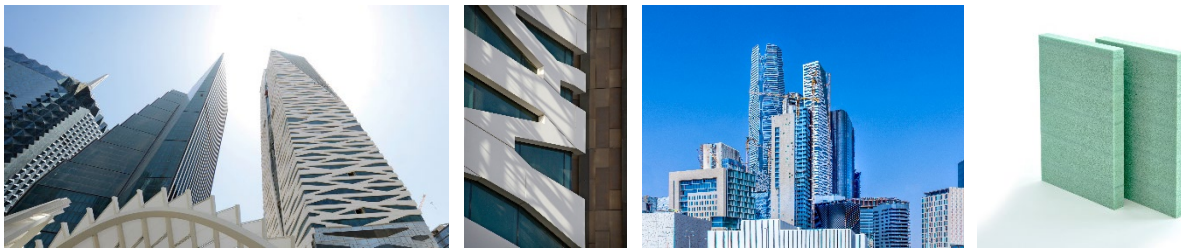
Customers have optimised their own way of working with ArmaPET core. Since the skin materials, resins and manufacturing process parameters all influence the final product performance and lifetime, Armacell cannot accept responsibility for the sandwich core set-up and its related performance. The manufacturer of the sandwich structure has to ensure that all the constituent materials are compatible with the actual manufacturing process and the process

parameters used and must also ensure that the end product is fit for purpose and suited to the service conditions. Armacell can be contacted for guidance on compatibility and related manufacturing processes and parameters.

CASE STUDY: FAÇADE CLADDING KAFD WORLD TRADE CENTER

The King Abdullah Financial District (KAFD) is Riyadh's state-of-the-art CBD. **Designed for the minimum 25-year warranty and 50-year expected life span** with minimum maintenance, and to meet the strict FST standards, the new 303-metre World Trade Centre takes the form of a 'vertical wadi'. Located on a prominent corner site and visible from miles away, it is clad in a sequence of linear composite panels, to stunning effect. BFG's all-composite solution brought to life Gensler's vision of an intricate panel design, with all the benefits of robust, lightweight construction and faster installation. Following comprehensive engineering analyses, structural design, and performance testing based on the ASTM E330 standard – which measures wind loads on exterior surface elements – BFG fabricated 3,180 lightweight sandwich cladding panels with an ArmaPET Struct core that are capable of resisting sand-laden loads carried in high winds at 300 metres above ground level.

BFG oversaw the entire engineering, fabrication and delivery of 47,000 m² of decorative composite panelling for the exterior of the 63-storey tower. The panels were constructed with an FRP outer surface and an ArmaPET Struct core, including aluminium structural struts, rockwool insulation and all the necessary components for an aluminium attachment system. The cladding meets stringent fire and smoke criteria and complies with the International Building Code (IBC) to meet ASTM E 84 Class A and NFPA 285.



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