# AIREX® T10

The Industrialized Structural Foam Core

The Next Generation
**PET** core
New and unlimited design possibilities

**Find out how AIREX® T10 can make you more competitive!**

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3A COMPOSITES CORE MATERIALS

# Unique properties

PET-based foam core materials were introduced some 10 years ago. Pioneered by 3A Composites Core Materials, this relatively young material has achieved a stunning and steep development both in terms of properties and volumes. AIREX® T10 brings PET foam to a new level of performance with a greatly improved properties and total cost position.

## AIREX® T10
## The Next Generation PET Foam Core

AIREX® T10 provides:

- Significantly higher mechanical properties vs. current PET cores.
- Fully homogeneous cell structure and no weld lines.
- Extremely consistent density throughout the sheet.

It also features the well-known advantages of PET based foam cores such as very high fatigue resistance, recyclability, high temperature resistance, outstanding quality control and consistency as well as thermoformability like today. Its high isostatic compression properties qualify this material also for low pressure RTM processes.

Take advantage of AIREX® T10 to:

- **Lower your core's density.**
- **Lower your core's thickness.**
- **Reduce your structure's weight and cost.**

# Unrivaled benefits of AIREX® T10 as structural core material

Compared to other structural core materials, AIREX® T10 features a most promising rating. Slightly heavier than PVC/SAN, it proves to be superior in the majority of other criteria including cost and also outpaces proven welded PET core on almost all accounts.

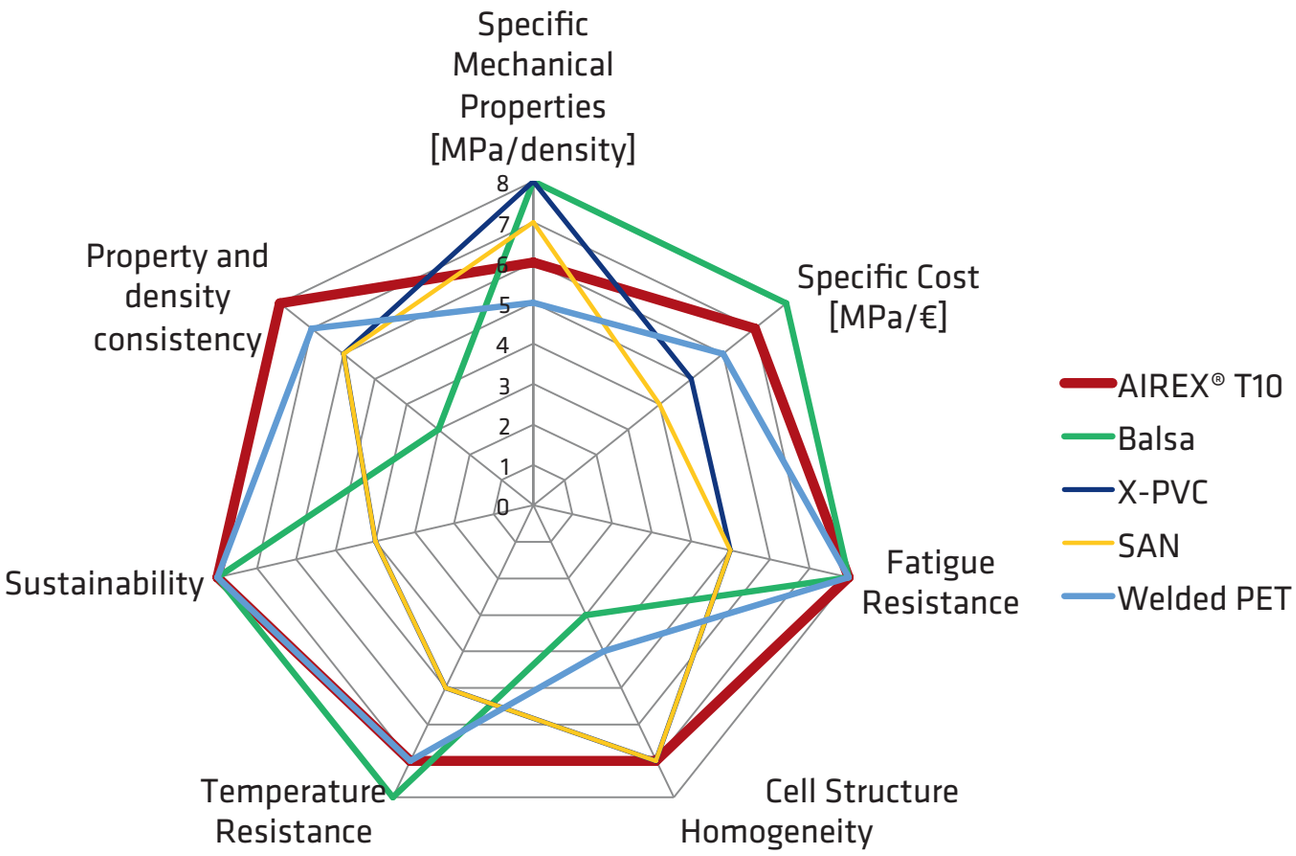



*Fig. 1. Comparison of typical structural cores against new AIREX® T10. T10 outperforming on majority of properties.*

# Exploit AIREX® T10's anisotropy

## Utmost weight reduction potential

Anisotropic properties are known and valued from fiber fabrics and honeycomb products. By taking advantage of these directional properties it is possible to design and create products with minimal weight and cost.

AIREX® T10 length properties are significantly higher while the width values are in line with comparable PET/PVC properties. The diagram illustrates that by taking advantage of the very high properties in length direction, AIREX® T10 can replace current cores of relatively higher densities, thus further extending its total cost benefit and expanding its use into a much wider range of applications.

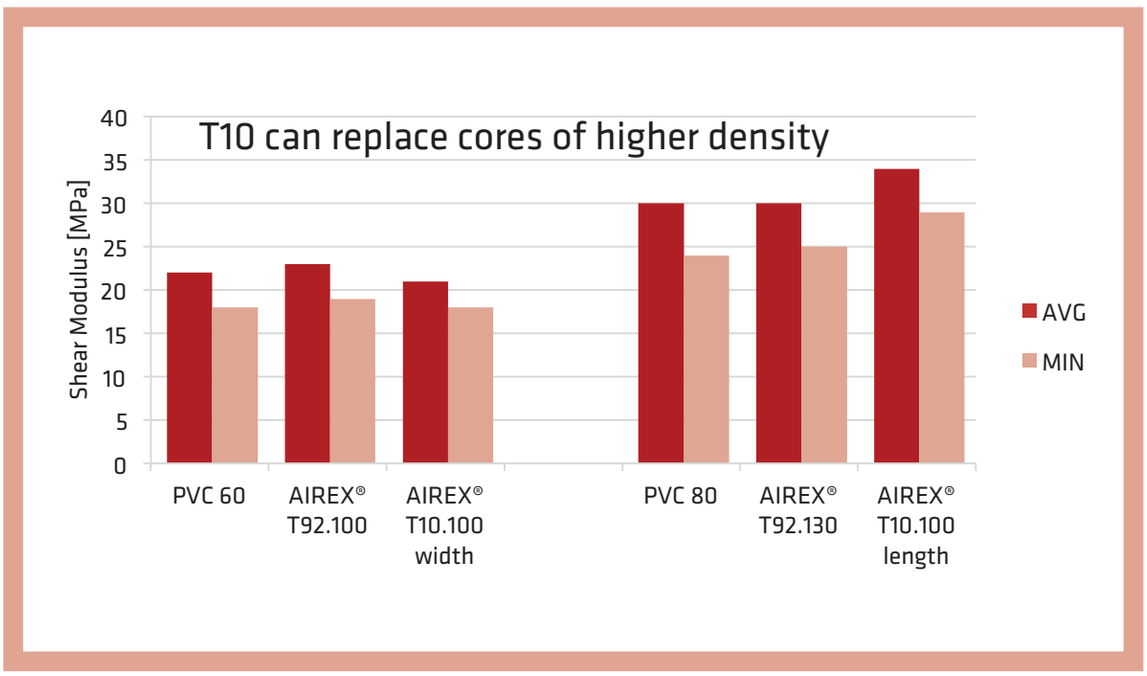



*Fig. 2. Comparison of shear moduli; AIREX® T10.100 can replace a 130 kg/m³ PET if its anisotropy is fully exploited.*

# Most cost-efficient core comparison for wind rotor blades

Wind turbine blade design study by STRUCTeam shows that in a same wind turbine blade the weight of AIREX® T10 core is some 14% lower than the required weight of a conventional PET. Furthermore, it proves a cost saving that considerably exceeds the latter weight saving. *Study from STRUCTeam available at 3A Composites Core Materials (corematerials@3acomposites.com).*

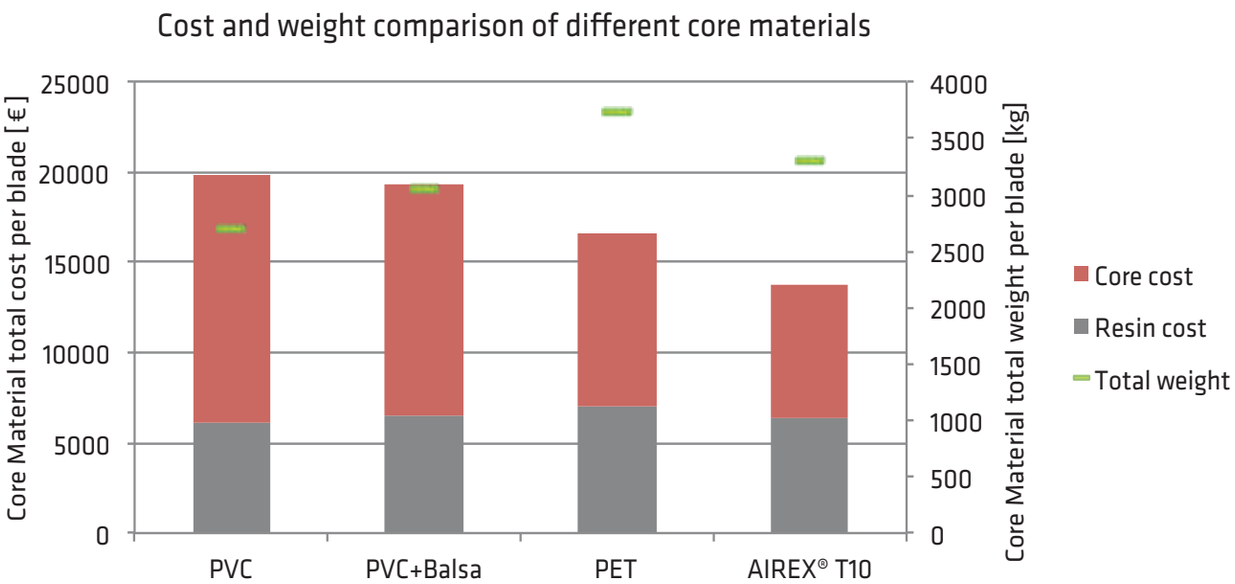



*Fig. 3. STRUCTeam's 80m blade study shows that AIREX® T10 noticeably reduces the cost of wind turbine blades over other core materials.*

* Resin: corresponds to core resin consumption

In its study, STRUCTeam proves that by exploiting AIREX® T10's very high length properties, T10 can be used at lower thickness than respective current welded PET cores (alternatively, a lower density of T10 could be chosen). Besides lower core weight and cost, this lower thickness also translates into lower resin uptake in the core's grooves and therefore into additional savings (resin weight and cost), bringing total weight of the AIREX® T10 core solution close to the very light PVC version.

Thanks to the high quality consistency and low density variation of AIREX® PET foams, the material's minimum values are quite close to the nominal average values and therefore allow optimal design of safety factors.


## Automobiles

Lightweight sandwich structures with excellent 3-D surfaces thanks to easy thermoformability and homogeneous cell structure.

# AIREX® T10

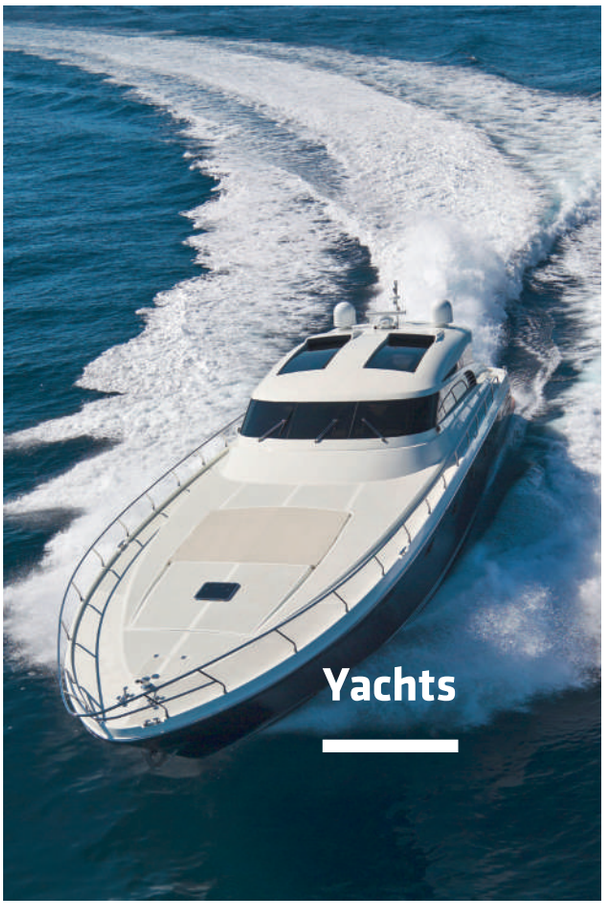
Unlimited possibilities

## Wind turbine blades & nacelles

Total cost and weight savings thanks to an industrialized production process and optimized use of directional properties of AIREX® T10.

## Boats

Marine: Excellent total cost proposition combined with outstanding properties and ease of processing.



## Yachts

## Truck bodies

Lightweight body panels with perfect surface quality.

## Architecture

Lightweight, insulating 3-D shaped structures.

# Align your core and win

The majority of sandwich applications are stiffness-driven with regard to panel bending. And a majority of these bending panels are not square but rectangular. In such rectangular bending panels it is the short span that experiences the higher stresses and strains.

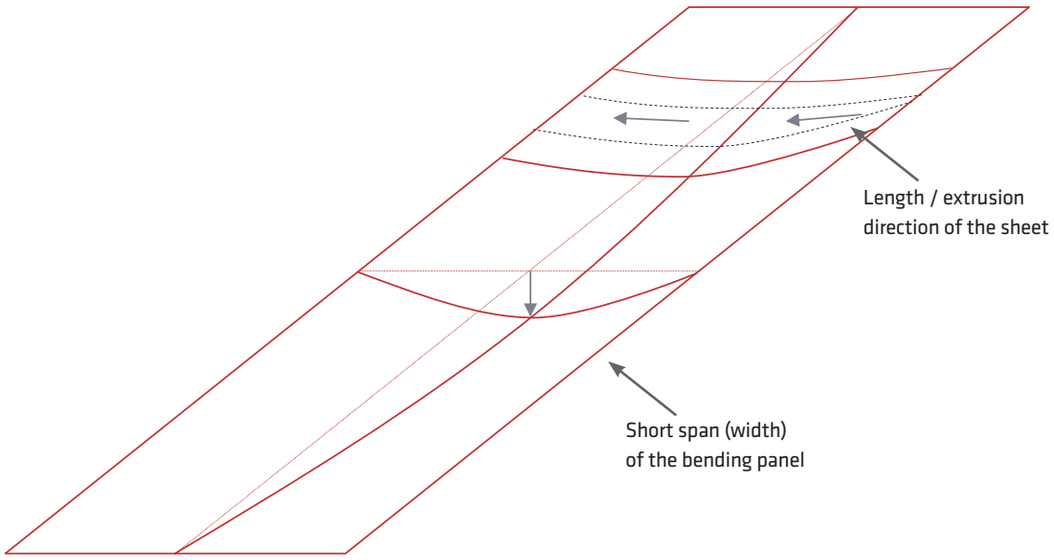



*Fig. 4. Rectangular bending panel. Stress and strain is higher in the short span (width).*

Designers and manufacturers can take advantage of this by aligning the AIREX® T10 core sheet accordingly in the mold (sheet's length parallel to the bending panel's short span).

Compared to conventional PET cores, AIREX® T10 now allows a reduction of the core thickness or its density without compromising the mechanical properties of the sandwich. Both options reduce weight considerably. And the respective cost savings by far exceeds the mere material cost advantage that has pushed PET's growth until now.

**Leverage AIREX® T10's advantages "to the max" by aligning the sheet length with the bending panel's shorter width.**

# **Homogeneous cell structure** and perfect surface quality

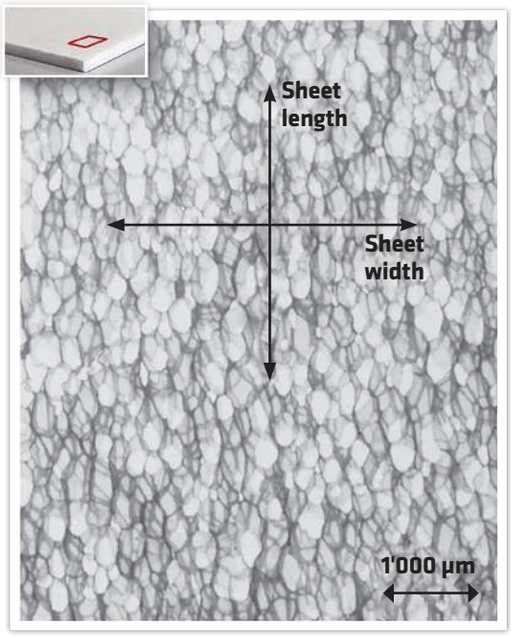



*Fig. 5. Top view onto AIREX® T10 sheet; homogeneous circular cells.*

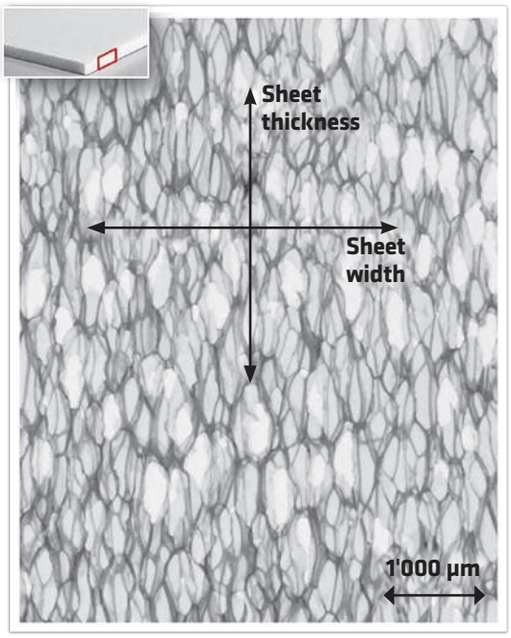



*Fig. 6. Side view (sheet edge); elongated cells in out-of-plane (thickness) direction.*

AIREX® T10 features a fully homogeneous cell structure. This allows the production of perfectly shiny surfaces (also in dark colors) and guarantees a minimum resin uptake.

The cell structure image on the top illustrates the nice cell homogeneity of the sheet surface.

The image on the bottom illustrates the distinct cell orientation in the sheet's thickness (out-of-plane) direction that enables the excellent mechanical properties of AIREX® T10.

# Full quality control and traceability

**Quality that never lets you down**

The very lean and fully automated production process of AIREX® T10 allows utmost process and quality control. AIREX® T10's density, cell structure, surface quality and thickness – a core's most important product characteristics - are measured and protocolled for each single sheet.

Furthermore, all production processes are narrowly monitored, controlled and protocolled. Utmost traceability is therefore guaranteed; and in the unlikely event of irregularities, the involved material volume can be clearly limited to the minimum.


*Fig. 7. Machine readable batch information on each sheet of AIREX® T10.*

## Clear sheet marking

To support full exploitation of AIREX® T10's directional properties, the length direction of each sheet is clearly marked with three labelling lines.

# Fatigue resistance - AIREX® T10 lighter than PVC

PET core materials generally feature a very good fatigue resistance. Any material weakens with an increasing number of load cycles. PET's fatigue resistance curve, however, declines much slower than other materials', for instance PVC core materials. The graphic below illustrates the strong fatigue performance of PET in general and of AIREX® T10 in particular. The low slope of the T10 curve proves its superior fatigue performance, outpacing PVC.

While PET cores and AIREX® T10 remain relatively heavier than PVC for static loads (low number of cycles), this reverses above approx. 5 million cycles; designed for high cycle fatigue, AIREX® T10 can actually replace PVC cores of similar density!

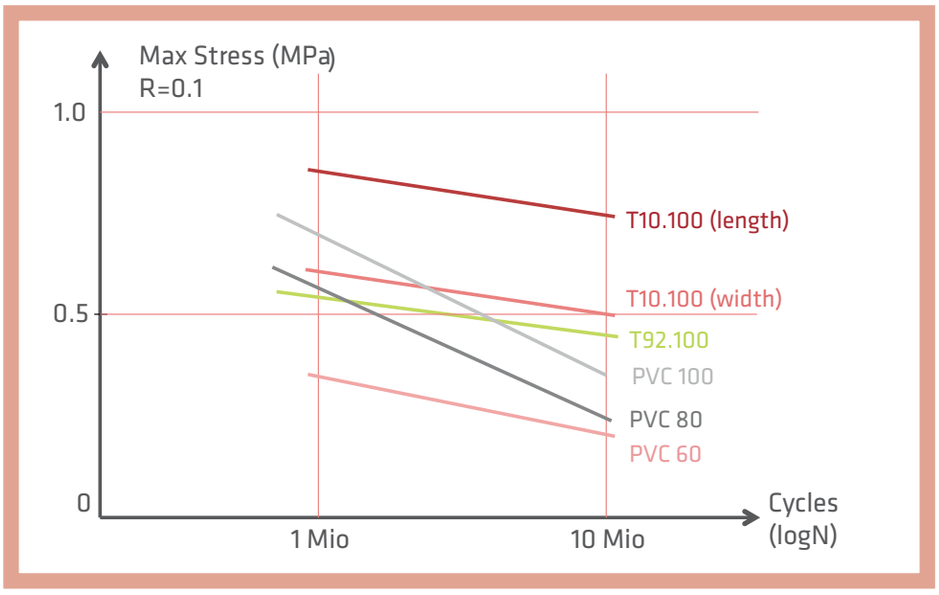



*Fig. 8. Fatigue resistance. AIREX® T10 performs better than PVC. Above approx. 5 million load cycles T10.100 actually outperforms 100 kg PVC.*

# The sustainable option

As all AIREX® PET-based foams, T10 is fully recyclable. Not only is all waste, cut-off and saw dust directly recycled, but each sheet of AIREX® T10 already contains recycled material.

Furthermore, our blowing agent is a mix of $CO_2$, as we clearly abstain from any ozone-depleting halogenated gases. In sandwich applications, AIREX® T10 helps to reduce weight and therefore raw materials; both in the product as well as over its life cycle (e.g. reduced weight and hence fuel consumption of a truck).

So, AIREX® T10 makes this world lighter and therefore a little bit greener.

# AIREX® T10

## The Industrialized Structural Foam Core

## ABOUT

## 3A Composites Core Materials

**3A Composites Core Materials** is a global organizational unit within 3A Composites, part of Schweiter Technologies (SIX Swiss Exchange: SWTQ), with operations in Europe, the Americas, India, China and Papua New Guinea, that has pioneered the sandwich technology for over 75 years. Its **3A Composites Core Materials** brand provides sustainable, lightweight and resource-friendly, high-quality core materials (broadest portfolio in the industry) to enable the production of lighter and thus more energy efficient end products for multiple applications such as wind turbine blades, nacelle covers, hull of a boat, automotive parts, bridge component, etc. All of these are products containing solutions by **3A Composites Core Materials** for the development, production, and distribution of lightweight composites and lightweight solutions for construction applications.

**www.3ACcorematerials.com**

COMPOSITES CORE MATERIALS


**Europe | Middle East | India | Africa**
**Airex AG**
5643 Sins, Switzerland
T +41 41 789 66 00 | F +41 41 789 66 60
corematerials@3AComposites.com

**North America | South America**
**Baltek Inc.**
High Point, NC 27261, USA
T +1 336 398 1900 | F +1 336 398 1901
corematerials.americas@3AComposites.com

**Asia | Australia | New Zealand**
**3A Composites (China) Ltd.**
201201 Shanghai, China
T +86 21 585 86 006 | F +86 21 338 27 298
corematerials.asia@3AComposites.com