



## Polymer Composites as Construction Materials

### Application Summary Sheet 30

**Title:** Airport Fencing

**Target Audience:** Design Engineers, Suppliers, Composite Manufacturers, Airport Authorities

**Keywords:** Fencing, Radar transparency, Safety, Polymer Composite

#### Overview of application / summary:

Composites have been employed for many years in the aerospace industry. Their superior properties and reduction in cost have now lead to their use at ground level. Performance is critical in aerospace applications, with airports and their services being no exception. Airport fences are situated in areas where good mechanical performance is required, radar transparency is imperative and safety is critical. The main reasons for the uptake in use of composites for airport fencing is their inherent radar transparency (which infers they do not interfere with aircraft Instrument landing Systems) and *frangibility*. That means they are stiff and strong during operation but fragile when hit by an aircraft in the case of an emergency. This feature significantly improves aircraft passenger safety and protection of the surrounding area.

Couple these two major benefits with sound mechanical integrity, ease of installation, maintenance free service life and in-depth colouring and it can easily be seen why composites are now chosen for airport fencing applications.

There are also apparent through life cost benefits. The fences do not corrode, even in severe weather conditions and do not require finishing or painting. The pre-assembled panels are light to carry and have simple and efficient fixing systems meaning no plant machinery is required for installation.

In the future recycled plastics may also be incorporate into the core material, which would further increase effectiveness whilst benefiting the environment. Approach masts and other aerospace ground constructions are now under development in composite materials because of these significant advantages.

#### Impact of application

##### Engineering:

- Frangibility – this type of structure is potentially dangerous in case of emergencies involving non-standard aircraft manoeuvres. Hence, such structures must be frangible – offering high stiffness and strength during operation and high wind forces, but fragile in

impact as specified by ICAO (International Civil Aviation Organisation)

- The fences can be erected rapidly due to their light weight and ease of handling, minimising disruption.
- The FRP fences do not contain any conductive elements and hence no electromagnetic interference will show on radar screens or disrupt Instrument Landing Systems (ILS)
- Outstanding mechanical performance – the fence structures account for wind loading regulations for the location in which they are situated and can withstand potential blasts of up to 300 km/h.
- The panels can be pre-assembled off site. Simple and efficient fixing systems means no extra operations or machinery are required during installation.
- The materials can operate in extreme environments such as temperatures down to  $-40^{\circ}\text{C}$ .
- The inherent corrosion resistance of the composite materials significantly increases the service life.

### **Financial:**

Although higher in initial cost, composite fencing systems offer significant through life cost savings in a number of areas:

- Longer service life increases the replacement frequency and therefore the costs associated with replacement and air traffic disruption are reduced.
- The inherent corrosion resistance reduces maintenance requirements & costly disruption to the airfield.
- The production process allow in-depth colouring – there is no need for post finishing or painting of the product.
- Transportation costs are dramatically lower due to the low weight of the components.
- The fence systems can be erected by fewer personnel and there is less need for specialist equipment during installation.

### **Environmental:**

- In many cases these fences replace wooden fences which are prone to leach chemicals into the surrounding earth such as creosote, which is now illegal in some countries.
- Future possibility of the incorporation of recycled plastics into the core material.

### **Social**

- Increased air travel safety due to the frangible nature of the structures.
- The fences are difficult to climb and internal fixing systems prevent easy removal, further improving airport security.

## **Robustness of research**

There are now numerous examples highlighting the uptake of composite airport fences across Europe. Barcelona and Brussels are two such prominent examples. Composite fence systems are also supported by the International Civil Aviation Organisation (ICAO) who have recognised the frangibility of the structures to be a major factor in improving airport safety.

## **Future developments**

It is anticipated that composite fence systems will penetrate the UK and US markets on the back of Aviation authority regulations. The Civil Aviation Authority (CAA) in the UK has recently made law for all utility structures around airports to be frangible, and it is anticipated that fencing will be included in this. The European Passive Safety standard for roadside structures will also support the introduction of composite airport fences.

The composite fencing market will also develop on a domestic scale. Although ILS transparency is not required for domestic applications, it is anticipated that end users will opt for the low maintenance and lightweight of these alternatives compared to wood or concrete.

## **Where to get further information**

### Companies

Bekeart Composites:           Industriepark De Bruwaan 2  
  B-9700 Oudenaarde (Belgium)  
  Tel: (+32) 55-33 30 11  
  Via: [www.engineered-composites.co.uk](http://www.engineered-composites.co.uk)

Exel Composites:               [www.exel.net/industry](http://www.exel.net/industry)

Shakespeare Composites: [www.shakespeare-ce.com](http://www.shakespeare-ce.com)

### Articles

International Standards and Recommended Practices – Aerodromes – Annex 14, Vol. 1, 2<sup>nd</sup> Edition, July 1995.

Civil Aviation Authority (CAA) (UK): [www.caa.co.uk](http://www.caa.co.uk)