



## Polymer Composites as Construction Materials

### Application Summary Sheet 19

**Title: Composite Swimming Pools**

**Target Audience:** Leisure Equipment Manufacturers, Design Engineers

**Keywords:** Leisure, Domestic Applications, Sports, Water resistant, polymer composite.

#### **Overview of application / summary:**

Domestic swimming pools are big business in the USA and Australia. It is estimated that the US pool and spa industry is worth \$8 billion alone. However, FRP swimming pools account for only 3% of this, despite offering distinct social, economic and environmental advantages over the concrete and vinyl liner pools that dominate the market.

The FRP composite shell structures have now overcome blistering problems encountered on their introduction, thanks to the development of vinyl ester resins. At present this application is pertinent in those countries with warmer year round climates. However, the economic benefits offered by FRP pools could help expand the market in other countries, particularly the UK,

The sports industry has also taken advantage of the property and construction benefits offered by FRP composites. A recent high profile example is the Sydney Olympic training pool, situated in Homebush, Australia. The pool harbours the largest fully removable composite floor in the world.

The application is a good example of synergy combining 22 tonnes of FRP's with 30 tonnes of corrosion resistant metal. The use of composites made installation possible in 8 months, at an average cost of \$1750/m<sup>2</sup> compared to \$3000/m<sup>2</sup> previously. The lighter weight of the floor allows it to be raised or lowered to cater for a range of activities, thus increasing the functionality and appeal of the pool.

#### **Impact of application**

##### **Engineering:**

- The higher strength/stiffness to weight ratio of FRP composite materials means that less material is required in the structure, and provides greater impact resistance as a result of these properties. Vinyl-liner pools are prone to cuts and other damage.
- The FRP shells can be pre-fabricated, minimising site assembly and installation times.

- The flexibility of composites allows the design and manufacture of almost any shape.
- A standard product range can be developed, maximising the efficiency of the ordering/delivery/installation process
- The shell construction method provides an opportunity for synergy with other materials to achieve desirable functional properties. For example, the addition of a ceramic core provides greater stiffness and thermal insulation.
- The shell can be completely finished and quality controlled before delivery.

### **Financial:**

- *Through life* costs are significantly less than for conventional pools due to a number of contributory factors:
- Site installation is typically 1-5 days, compared to 4-8 weeks for a concrete or liner pool
- The light weight reduces personnel and site equipment requirements during installation
- No periodic maintenance/re-painting is necessary
- Power consumption is less due to better thermal properties.
- It is claimed that they require fewer water treatment chemicals than conventional pools due to less microbial contamination.
- FRP shells can be sold direct to the homeowner for D-I-Y installation.

### **Environmental:**

- Electrical and chemical usage is about half that of a concrete or liner pool, meaning extraction and processing benefits for the environment.
- There is no leaching of chemicals from the shell into the surrounding earth.

### **Social**

- Rapid installation causes minimal disruption to the domestic routine.
- Pools can be manufactured to the specification of the customer.
- The pool can be moved to a new place of residence.
- The pools can be installed all year round, unlike gunite pools which cannot be installed in cold weather.
- FRP shell pools are the least dependent of all pool types on the skills of the installation crew.

### **Robustness of research**

This is a predominantly market driven leisure product. Less significance is placed on the structural performance as would be in industrial applications. Therefore there is little 'pure' research behind the products, manufacturers have taken up the use of FRP's because of their production benefits, long term durability and negligible maintenance requirements. The leisure industry

have taken a lead from the marine and offshore industries, where FRP composites have been proven to provide high performance in aqueous and corrosive environments. Long term cost effectiveness is the major driver for this domestic product.

### **Future developments**

It is inevitable that manufacturers will start adding FRP composite pools to their product portfolios as consumers become aware of their functional benefits and economic savings. The products will become more readily available and cheaper as manufacturing systems develop.

Internet ordering of 'standard' pools is already available and will become a large market over the next 5-10 years as the concept filters from the main markets in the US and Australia. The ability for self installation will also attract a wider market due to associated financial savings.

There is the potential for development of indoor FRP composite pools in the UK. A total FRP 'system', including covering structure, would reduce costs and promote the product to a wider market.

### **Where to get further information**

#### Companies

Oasis Swimming Pools - California - Advanced Composite Pool (ACP™)  
[www.deluxepool.com/acp.html](http://www.deluxepool.com/acp.html)

Advanced Composite Technology Company Ltd - Australia  
[www.adcomp.comp.au](http://www.adcomp.comp.au)

Antiwave - FRP pool components  
[www.dibro.co.nz/antiwave](http://www.dibro.co.nz/antiwave)

#### Articles

"FRP swimming pools' low maintenance, high quality make a splash"  
Feature in "Composites Technology Magazine", July/August 2001.