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amazing glass fibre technology

Glass Fibre Reinforced Concrete
(GFRC)

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The definition of GFRC (Commonly Known as GRC)

- Simplistically - GFRC is concrete with added fibre glass strands for strength
- Concrete is a GREAT PRODUCT :-
 - Has been around since Roman times – it has stood the test of time
 - Add glass fibres and it becomes even stronger & more durable
 - Enables amazing shapes, sizes textures and colour finishes
- Concrete has excellent resistance to ageing and compressive strength
- The engineering benefits of adding glass fibre are:-
 - Tensile strength - strength when stretched
 - Flexural strength - provides strength when bent
- Enables the manufacture of thinner products than those manufactured in cast cement – yet maintains the great qualities of concrete
- The key commercial benefit of GFRC is that it weighs less than concrete for the same purpose

What is GFRC?

GFRC is strong and durability

- Excellent in an out-door environment



- Each strand is coated with cement.
- Provides substantial additional strength
- Highly resistant to harsh weather conditions

The manufacturing process is important

- The slurry mixture is critical
 - Quantities must be precise
 - Portland cement, Water, Sand and/or aggregates, Polymer, Plasticiser, Fibreglass strands
- Poured or sprayed into product moulds - for form & texture
- Coloured – for aesthetic appeal
- Cured – for strength

Note:

- * Not all GFRC is good GFRC
- * Even bad GFRC can look good initially

What is GFRC?

Manufacturing process – Spray gun process

– to provide a high quality appearance and consistent quality





What is GFRC?

Manufacturing process –
Adding the fibre glass

– to provide flexural strength

What is GFRC?

Manufacturing process – Smoothing

– hand rolled to ensure full coverage of the mould and parallel fibre orientation for maximisation of strength



What is GFRC?

Manufacturing process – Smoothing
– hand rolling is labour intensive



What is GFRC?

Manufacturing process – Joining

– precise joining is critical in reducing seamlines



What is GFRC?

Manufacturing process – De-Moulding

– moulds are left to harden before de-moulding



Some of these moulds can have as many as 30 parts

What is GFRC?

Manufacturing process – Colouring

– may include brushing, spraying or washing depending on the finish required and can take up to a week to complete



Impressive array of textures

What is GFRC?



This enables great scope for the continuous development of new ranges

What is GFRC?

Endless Shapes & Sizes



This enables innovation and the flexibility to quickly follow new trends

What is GFRC?

Traditional & Contemporary Styles



This enables the development of a comprehensive product range to suit all tastes

What is GFRC?

Earthy & Unique Colours

- Colours that cannot be easily replicated by competitive products



This provides a distinct product differentiation in the market



Why isn't all GFRP the same?

It all starts with the slurry

- Quality of the ingredients – must be controlled
 - ISO 9000 compliant cement manufacturer
 - Specific shape and size sand/ aggregate
 - The water PH level
 - Fit for purpose polymer
 - Fit for purpose plasticiser
 - Alkaline resistant fibre glass
- Quantity of the ingredients - must be precise
- Consistence of the slurry mix preparation - must be process driven
- Quality assurance – is essential
 - To monitor the process consistency
 - To continually test samples
 - To monitor raw materials supply

Why isn't all GFRC the same?

Not all glass fibre is the same

Quality depends on:-

- The length of fibre – longer fibres provide greater strength (up to a point)
- The quantity of fibre – more fibre provides greater strength (up to a point)
- The orientation of the fibre – random direction fibres don't have the strength of parallel direction fibres
- The type of glass fibre itself – alkaline resistant glass fibre is essential but more expensive



Example of random fibres



Example of sprayed parallel fibres

Why isn't all GFRC the same?



Spray gun technology enhances quality

Three-dimensional reinforcing

- Slurry is mixed in a bucket and poured into moulds
- Fibres point in all different directions
- < 20% of the fibres oriented correctly

Two-dimensional reinforcing

- Slurry is sprayed into moulds
- 30% to 50% of the fibres oriented correctly.

The best GFRC is made with a spray gun

Why isn't all GFRC the same?

Reliance on fibre glass matting can create problems

- Reliance on fibreglass matting and thicker product walls is bad GFRC
- This type of GFRC is considerably heavier than that produced by spray gun technology
- Fibreglass matting is susceptible to wafering which is a cause of spider cracking and flaking.

- Most small GFRC manufacturers rely on fibre glass matting
- This type of GFRC tarnished the name of GFRC in the market
- Spray gun technology is the only way to go

Why aren't all GFRC suppliers the same?

A good GFRC manufacturer understands
"Optimising Retailer Value"

- Fit for Purpose
- Fit for Transport
- Fit for Customer



- Poor GFRC is easy to make
- The art of manufacturing good GFRC includes :-
 - making it well
 - transporting it intact
 - transporting it at the least cost per unit
 - making it attractive to the retail customer

Why aren't all GFRC suppliers the same?

“Fit for Purpose”

- **Product engineering** – good results require good design
 - Clarification of customer requirements
 - Different products require different strengths
 - Relates to the slurry specifications
 - Relates to the thickness of the walls of the product
 - There is always a tie off between strength and weight with GFRC
 - In-door or out-door use
 - Harsh weather conditions – extreme colds, wet or UV
- **Product testing** – to ensure results meet expectations
 - Flexibility, impact resistance, drop testing, freeze/thaw testing
- **Manufacturing process control** – to ensure consistency
 - Standards - need to be defined
 - Quality assurance - needs to be continuous

Why aren't all GFRC suppliers the same?

“Fit for Transport”

- Packaging
 - Clarification of customer requirements
 - Design of packaging to fit the purpose
 - Wood quality assurance
 - Testing the packaging for every new product



Why aren't all GFRC suppliers the same?

“Fit for Transport”



- **Palletisation**

- Clarification of customer requirements – cardboard or wood
- Optimum size – to minimise transport cost per unit

Why aren't all GFRC suppliers the same?

“Fit for Transport”

- Containerisation
 - Clarification of customer requirements
 - Pallets or loose pack
 - Designed to maximise the space in a shipping container
 - Still needs to look aesthetically attractive



Why aren't all GFRC suppliers the same?

“Fit for Customer”

– innovation & style





Why aren't all GFRC suppliers the same?

“Fit for Customer”

- Ultimately, if the product sells the retailer will continue to buy

Key selling points of GFRC

Unique colours & textures

- Many of which are not able to be found in other types of products

Light weight & strong

- Provides a feeling of substance without the excessive weight of stone or cast concrete
- In-store moving and transport from display to customer easier than very heavy stone or cast concrete
 - This makes life easier for a retailer or landscaper

Weather resistant

- Does not break down in harsh weather
 - This is important, particularly when compared to fibre clay and plastic
- Acid etched colours do not crack, peel or substantially fade
 - This avoids customer complaints.

Environmentally friendly

GFRC Compared to Fibre Clay

Fibre Clay products generally have a very low cost to produce and on that basis are often considered competitive products to GFRC. This is often an accurate assessment when based purely on the cost for smaller items that are not subject to continuous contact with water or wet soil such as small planters. However, in all other circumstances GFRC is a far superior product.

- GFRC does not breakdown due to continuous contact with water or wet soil
--- Fibre Clay does.
- GFRC can be made to be much more resistant to water absorption which is important for water features and for protection against freeze/thaw conditions
--- Fibre Clay can't.
- GFRC enables the use of infused oxide coloring which is fade resistant in both high UV and general harsh weather conditions --- Fibre Clay can't.
- GFRC can be made to provide industrial grade structural strength for larger items and commercial use --- Fibre Clay can't.

GFRC is a great product

It's all about how it's made

