GRC in house building

Glass-fibre-reinforced concrete (GRC) has been used worldwide since the early 1970s. Over the last few years there has been a growing recognition of the material as a durable and lightweight alternative to the traditional natural and cast stone architectural dressings used in house building.

Bob Faulding, GRCUK

Architectural dressings, usually in natural or latterly cast stone, have been used in house building for many years. From the classical designs of the Georgian period to the present day, stone dressings can transform the appearance of both brick and stone façades at relatively low cost.

In the UK virtually every house builder and developer recognises the benefits of incorporating these elements to increase the visual appeal of their houses.

However, with the increasing emphasis on speed of construction and the growing concerns relating to the manual handling of building products, the use of traditional natural and cast stone is becoming more problematic in terms of site damage and item weight.

Durability

Both natural and cast stone should be handled with care to avoid damaging the crisp sharp edges that define the material. It appears to be increasingly difficult in today's modern construction environment to ensure the material is handled in the correct manner.

Another problem is that of cracking in longer units. Neither natural nor cast stone has high tensile strength and therefore care must be taken during site transportation and installation to avoid cracking products. Again unfortunately this often proves difficult on busy building sites.

As a result, stone dressings such as cills are considered among the products requiring most post-installation repair work by specialist repair companies. An entire sub-industry has developed to repair these components using specialist masonry paints and resins. Unfortunately, some of these repairs detract from the natural beauty of the materials and can leave the home owner disappointed with the quality of their stonework.

Many of these potential problems can be overcome by the use of high-quality GRC architectural dressings. Modern finishing techniques allow manufacturers to produce products that closely resemble natural and cast stone. While these components are visually the same as the traditional material, the composition of the concrete is entirely different. As its name implies, GRC contains a proportion of alkali-resistant glass fibres. This is generally between 2–5% by weight and is blended throughout the concrete matrix. As with most composites, the resultant products have high tensile and impact strength. Damaging a product correctly manufactured in GRC would require significant impact force or tensile stress and certainly greater than would be expected during the normal building process.

Weight

Another major advantage of GRC elements is the reduction in weight over equivalent natural and cast stone items. Due to the inherent strength of the material, GRC can be manufactured using thin-wall casting techniques.

With these hollow profiles, weights can be reduced dramatically, often eliminating the need for two-man or mechanical installation. This of course has major benefits for manual handling, particularly as the Health and Safety Executive has identified cills and lintels as being one of the major risk products in relation to manual handling.

Door surrounds and canopies

Door surrounds and canopies are other examples of how GRC can provide an increase in perceived value at modest cost.

Originally such embellishments were always carved in natural stone, which clearly was expensive. Over the years this high cost saw the replacement of stone with timber on

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This is the sixth in a series of technical notes covering aspects of glass-fibre-reinforced concrete (GRC) technology.

The Glassfibre Reinforced Concrete Association (GRCA) is a Special Sector Group of The Concrete Society.

Figure 1 left: Typical Georgian country house with natural stone features.

Figure 2 below: GRC door canopy used with Cotswold stone.

Figure 3: GRC door surround creates a dramatic entrance.

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Table 1 – Comparative unit weights

Item	Typical Wt	GRC Wt
915 Opening Cill	44kg	15kg
915 Opening Head	52kg	19kg
1200 Opening Cill	55kg	19kg
1200 Opening Head	65kg	24kg

all but the grandest of properties. This in turn was replaced by glass-reinforced plastic (GRP) which offered a low-maintenance alternative at similar cost.

Today many house builders and developers are realising that the addition of GRC door surrounds and canopies can significantly increase the 'kerb appeal' of their developments without incurring increased costs over other products. No one can deny the impact a stone door surround can have when first visiting a property.

Most GRC surrounds are fixed post-masonry completion using engineer-designed fixing systems and can generally be installed by site joiners much as their GRP counterparts.

Other applications for GRC within house building are roof tiles, finials and fire surrounds although because of the versatility of the material the only restrictions are generally the imagination.

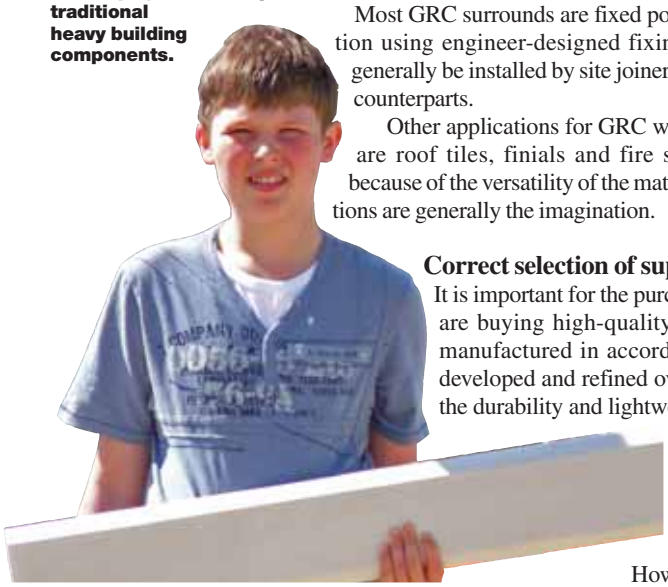

Figure 4: GRC makes child's play of handling traditional heavy building components.

Correct selection of supplier

It is important for the purchaser to ensure they are buying high-quality GRC components manufactured in accordance with methods developed and refined over 40 years. Due to the durability and lightweight nature of GRC there are many materials that imply by their name they are GRC or are sold as GRC derivatives. However, most of these products would not meet the requirements of the testing methodology which has been introduced internationally following many years of involved study and research.

All correctly manufactured GRC will comply with the requirements of the Glassfibre Reinforced Concrete Association (GRCA) specification and be classified into a series of grades defined by its strength performance. For house-building applications Grades 8 or 10 are generally acceptable although purchasers must verify the manufacturer is carrying out regular testing to ensure compliance.

The Association operates a scheme whereby member companies test their materials on at least a weekly basis and are manufacturing products which have been produced using established and proven techniques.

Another important factor when choosing a supplier is that of the provision of technical and engineering support. Due to the unique nature of GRC profiles, manufacturers must be able to provide engineered fixing details or demonstrate products can take compressive loadings in built-in situations. All reputable GRC manufacturers, and certainly those party to the Approved Manufacturer Scheme, can provide these services along with the provision of full component and, where required, construction details.

Concluding remarks

GRC is a highly durable and lightweight family of composite materials that can offer house builders significant advantages over more traditional types of natural and cast stone architectural dressings.

By using GRC, damage and subsequent repairs can be reduced considerably and because the majority of components weigh less than 25kg the manual handling problems associated with cills and lintels are virtually eliminated. ■

■ Further information:

For further details of the GRCA Approved Manufacturer Scheme visit: *www.grca.org.uk* or for information on combined membership of the GRCA with The Concrete Society, e-mail: membership@concrete.org.uk