

GRC in the Czech Republic and Russia: development of the ORTODUM company

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Introduction

Our company, ORTODUM, was set up in 1999 by the Polyak brothers – two Russian enthusiasts of glassfibre-reinforced concrete. At that time they had a feeling that GRC (glass- reinforced concrete) production was a beautiful, quiet and profitable business. In reality, it became a little more complicated than that.

From start-up to the present day, ORTODUM has focused its attention on two markets: Russia and Czechoslovakia. Prior to ORTODUM there were only one or two small companies in each of these countries, both companies being virtually unknown to the wider circle of clients and architects. Consequently, it took the company about two years to familiarise potential buyers and architects with the material, which was new to them. We visited them and showed them photographs of GRC buildings, which other people had built in other countries; we demonstrated GRC on our first samples and pointed out that the quality of our product could outstrip those illustrated in the photographs. In arguing that GRC was the best, the most aesthetic and the most cost-effective material, we cited Mr I. White and Mr I. Peter (of the International Glassfibre Reinforced Concrete Association) many times. It was probably this fact that lent us credibility and we are very thankful to them for that. There is little point discussing at length the beginning of our activities as we believe that many members of the IGRCA have followed a similar path to ours. Let us therefore move on to our projects.

Types of project undertaken

The ORTODUM company deals mostly with residential buildings and public facilities. Orders for such buildings can be categorised into two main groups: first, rainscreen (ventilated) façades; and second, façades built in different ways, using different materials, where the GRC is applied for decoration (see Fig. 1).

Buildings in the first category can be split according to the way the facing panels are fixed, either by through-fixing or by concealed fixing, the latter being the preferred option. In all projects of this kind we have to compete with an army of large companies, which mass-produce facing panels at prices lower than ours – sometimes as much as 100% lower. Our advantage lies not in low pricing but rather in being able to meet clients' requirements in terms of surface appearance, texture and panel geometry.



Figure 1- central office of Czech-Slovakian Trade Bank

It follows that clients who are willing to pay for such intricacies are extremely discerning. The majority of such clients seek a minimalist style and prefer the look of 'natural concrete'. This approach to architecture can sometimes suggest a lack of imagination on the part of clients and it is often difficult to convince them that the colour separation of the panels, dark and light spots, sometimes even an appearance of efflorescence (salt) do not reflect poor quality or performance but, on the contrary, are meant to mimic cast-in-situ concrete. On the other hand, lovers of colourful façades are usually more forgiving, and are happy with the richness of colour that GRC can offer.

Architectural elements made from GRC, i.e. cornices, window and door surrounds and cills, columns and semi-columns/pilasters, are very popular, particularly in Russia (see Fig. 2). In this regard, our main competitors are mostly firms that produce 'plastic' decorative elements. Here, our trump card is the durability of our product, supported by its 'natural' appearance. Competitors who produce their goods from 'artificial' stone usually lose in terms of weight, which also includes the fixing system. The ORTODUM company is particularly proud of the huge variety of surfaces it has learnt to create, and is currently seeing a dramatic fall in the number of orders for smooth painted surfaces.



Figure 2 - Orthodox Heritage Centre, Moscow region

In order to create different types of surface, we use a number of well-known technologies (e.g. retarding agents, acid etching, sandblasting), as well as our own less well-known innovations. Normally, the basic requirements are obtained from our clients, for instance black granite, blue limestone, red sandstone and so on, sometimes accompanied by a request to decorate the surface with insets of different size and colour. In such cases we try to produce a couple of samples in a very short time, satisfying all the client's requirements. In the vast majority of cases we manage to achieve this, even in situations where the client has sent us merely a fragment of an exotic natural stone as a sample.

The next step is more complicated. The client evaluates our skills and we receive an order, according to which, in the shortest possible time, we have to produce several thousand square metres of goods; in addition, these goods have differing configurations. The most difficult stage of the work during the mass production process is to faithfully recreate in full scale the 30 × 30 cm sample. This often proves to be a very challenging task. However, in the global marketplace where we face competition from large construction companies, we find it more profitable to satisfy the demands of such clients than to deal only in a standard and rather narrow range of surface types.

In addition, one of the company's most interesting enterprises is the architectural decoration of ecclesiastical buildings. In this field we have undertaken a series of projects which were interesting both in terms of aesthetics and complexity of the technical tasks solved. The production of GRC elements for the interior finish of the Archdiocesan museum in Olomouc (Czech Republic) necessitated considerable attention to production precision, as the whole interior of the museum consisted of joined special elements, part of which are stretched in all directions. When producing the cupola of St Florian and the cross of the Church of the Holy Ghost we had to take into account the numerous requirements of erection teams who had to perform high-altitude operations.

There were many problems to be solved with other buildings of religious architecture too; for instance, the Centre of Orthodox Heritage in the Moscow region; St Dmitry Donskoy Church in the Urals; and the largest Buddhist temple in the whole of Europe, which is situated in Kalmykia (see Fig. 3). We at ORTODUM are pleased to work in this field, as the architecture of such buildings is very sophisticated and varied in form and is perfectly in tune with the versatility of GRC. Our technology is also equally suited to the architecture of different religions and we to this end we are striving to enlarge our circle of clients.



Figure 3 - Hurul Gol-Sume, Elista, Kalmykia, Russia

Balconies and other 'standard' products

There is no doubt that, having promoted our forte of an individual and bespoke service, we do miss the everyday production of standard products. The search for our niche product continued for a long time until, finally, we found it – namely balcony parapets. We have delivered parapets to many buildings in both Russia and the Czech Republic. Normally these were panels 10–12 mm thick, sometimes with a textured surface, which were fixed to a thick steel frame. A mass reconstruction of blocks of flats built using load-bearing walls began in the Czech Republic. During reconstruction, which took place while the inhabitants remained in their apartments, the original small steel balconies were removed and replaced by large reinforced-concrete recessed balconies. It was decided at ORTODUM that the missing elements of these new recessed balconies were GRC parapets, which could be used as single elements of a trapezoidal shape, to be quickly installed from the 'wheels' (see Fig. 4).

The following requirements had to be taken into account:

1. the need to provide parapets of adequate strength during assembly and handling;
2. weight restrictions;
3. a good surface quality for both the inner and outer faces;
4. the possibility of future glazing. The conclusion was that it would be natural to produce them as sandwich panels with a lightweight inner filling.



Figure 4 - Restoration of a dwelling house, The Czech Republic

As qualified specialists and full members of the International Glassfibre Reinforced Concrete Association (IGRCA), the staff at ORTODUM were fully aware that received wisdom dictated that it was not possible to produce sandwich panels from Cem-FIL GRC (technical data from Saint-Gobain Vetrotex). However, long-term experience of previous work in the Soviet Union during the Communist regime had shown that the Russian people could deal successfully with any task, even at the cost of great sacrifice. So, that was how it happened. The first batch of our goods, which we offered to the

market four years ago, aroused much interest and we received many orders. Interest has not diminished, but unfortunately began to change to that of an 'unhealthy' nature, as Freud would say. The fact is that about six to twelve months after installation of the balcony parapets, cracks began to appear and this phenomenon was widespread. All possible structural and technological solutions for modifying the 'sandwich' parapet were analysed. However, until recently all attempts resulted merely in price increases, with all the new, more expensive, parapets suffering the same cracks as the cheaper ones. In addition, the number of new orders increased in proportion to the number of claims. However, a year ago, a small miracle occurred. The wildest suggestions of our staff for solving the problem were tried in practice and the sandwich parapets did stop cracking. A lot of money is now being spent on replacement and repair of the old low-quality parapets, but we are very proud of ourselves.

Our next achievement was the use of GRC as permanent formwork. We have obtained the necessary certification for use of the formwork in road construction, and every year we receive orders for cornices, cable ducts and other bridge elements (see Fig. 5). The important thing is that our clients agree that the quality of the GRC is so much higher than that of the highest-grade mass concrete and that GRC formwork can be used to protect mass concrete from exposure in aggressive environments. Consequently, the largest number of orders received are for bridge cornices.



Figure 5 - Scaffold bridge at the Prague airport

An interesting example of ORTODUM permanent formwork in civil engineering is the formation of large window surrounds in the state library in Hradec Kralove (Czech Republic).

Conclusions

It has been a difficult journey for ORTODUM over the last nine years. During the first year, we produced 2000 m² of GRC goods, and in 2007 this rose to 40 000 m² per year. In many cases we asked the IGRCA for help and support and we were never refused. The company is grateful for that, and in particular we would like to thank Mr I. White and Mr I. Peter who helped us even in situations which may have seemed hopeless. However, there is also a request for the Association. It would be helpful if the Association developed a uniform standard for the acceptable deviations of GRC products in

terms of geometric parameters (size/shape), surface quality, etc. It would help everyone by minimising disputes with clients regarding quality control. We would be pleased to participate in the preparation of the relevant document, taking into consideration the absence of relevant European standards. It would also be a good idea for The Concrete Society to introduce in *CONCRETE* magazine a permanent 'column' devoted to GRC and describing the most interesting projects to be built by members of the IGRCA.

Finally, it can be said that GRC production is a business that requires total dedication of physical, moral and intellectual power, but is enjoyable and rewarding.