

TATRAN FRP – *Composites Solutions*

SPACE
BRIDGE FUND





Project FRP Composites Solutions



1. Problem.

All building structures, both existing and contemporary built, both residential and civil engineering, are exposed to corrosion biological. Even these monolithic structures made of concrete reinforced concrete are also exposed to corrosion. Unfortunately, the lack of action preventive measures that lead to inhibition of the corrosion process significantly reduces the durability of buildings and often leads to the need to demolish them and build from scratch, using the same technology.

At a time of urgent need to protect the climate and reduce emissions harmful substances any action affecting the rational management of natural resources, limiting production cement, reducing heat losses in buildings and using Building materials that can be recycled and reused in the future is a problem that must be solved in many sectors of the economy, including the construction industry.

Currently, 80% of buildings in the European Union do not meet energy standards and urgently require thermomodernisation.





Project Composite FRP tie



2. Need.

Contemporary sustainable architecture forces manufacturers construction products, suppliers of equipment and handling systems construction and on contractors and investors to make reasonable resource management, waste accounting and the requirement to use of materials that do not have a negative impact on the environment natural or man-made; materials in the manufacture of which no harmful emissions or excessive consumption have occurred energy. It is also necessary to use materials that can be recycled and reused in the future.

A separate, equally important requirement is the need to use materials construction, which increase the durability of buildings, are resistant to No destructive influences and no loss of heat in the partitions of the designed building structures.

Optimization of construction costs in terms of materials, working time, elimination of the risk of active human error is an important and urgent need to be taken into account at the design stage of construction works.





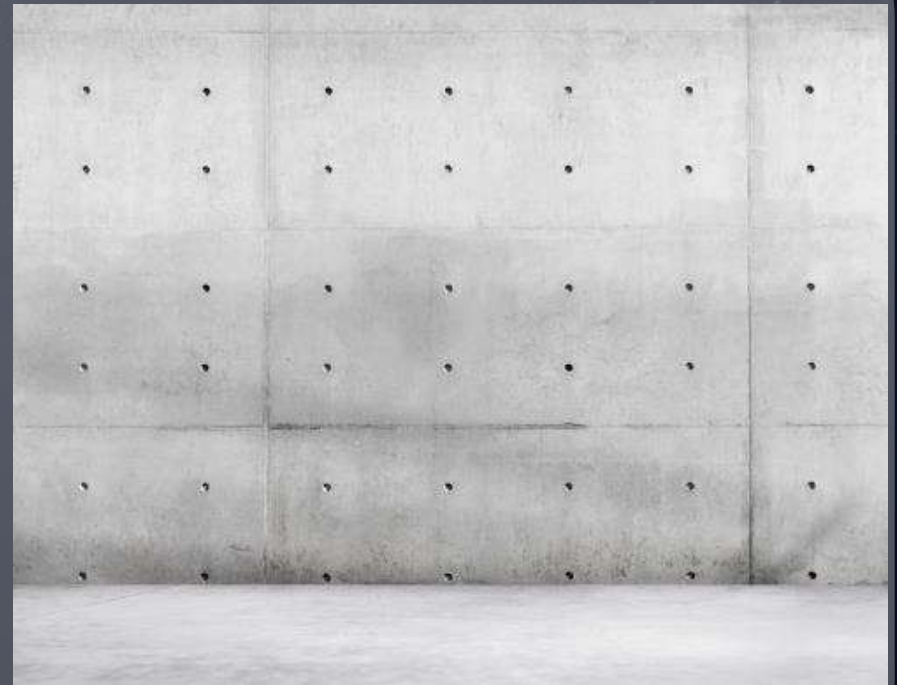
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3. Solution.

The R&D project named **FRP Tightening - innovative composite weld for lost formwork** otherwise known as composite ankra is to be used as a replacement for the steel turnbuckle currently in use in shuttering systems as a structural stabilising element monolithic reinforced concrete structures in buildings and engineering.

COMPOSITE STRING - made of GFRP glass fibre
- can be used in shuttering systems as an element of a structural device for connecting and stabilising two of opposing formwork. Formwork systems are commonly used in monolithic, concrete or reinforced concrete construction, construction of buildings and structures (engineering structures). The main objective of this project is to replace existing and commonly used in formwork systems steel ties by composite ties.





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3. Technology.

Composite tie rods are made of rods composite materials made with poly-trusion technology, in which fiberglass roving is dipped in epoxy resin with the addition of a hardener, interlaced along its axis, and then cured at about 40 °C after stress and undergoing a relaxation process. Depending on the expected the thickness of the composite bar increases the number of spools accordingly glass-fibre roving, which makes it possible to obtain the appropriate cross-section bar thickness in the range from 4mm to 42mm. Bars have a natural olive or graphite colour, but may be coloured as follows any other colour. Bars with diameters of 4-12mm are rolled into coils, while rods with a diameter of more than 12 mm are produced in sections straight. All bars have a warp around their own axis - a braid that increases adhesion to concrete.





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4. Construction design office & structural reinforcement composites center

One of the primary advantages of composite bar is its light weight, corrosion resistance and resistance to other aggressive environmental factors, including resistance to alkalis. Composite bars are excellent insulators, as they do not conduct heat, which prevents the formation of unwanted thermal bridges in structures construction. Composite bars do not conduct electricity or interfere with electromagnetic waves. Application of rods composite products in the construction industry make it possible to reduce the amount of concrete in building structures. Composite products glass fibres are recyclable and reusable. They have no negative impact on the environment.

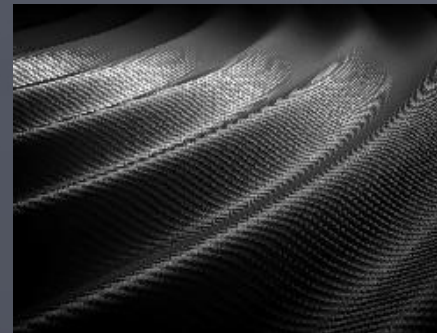




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4. Construction design office & structural reinforcement composites center





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5. Market.

Development of ecological building in Poland progresses very dynamically. Many developers and investors are manifesting interest in developing this area of the market. A particular increase in interest could be observed in the sector commercial, where office buildings already use modern technologies for facility management as a standard. This makes them greener and increasingly desirable to tenants. In 2018, expect, that the eco-building trend will continue and the number of further investments in intelligent and energy-efficient buildings will be increase. Green building of the future should reduce construction waste and minimize energy consumption related not only to the use of the building itself but also to the production and transport of building materials.

In view of the growing demand for electricity and increasingly high energy prices, energy-efficient houses, energy-efficient building materials, renewable energy sources and energy recovery will become increasingly popular.

From the point of view of resource-efficient construction, the last element certified in the quality assessment is crucial of a building in terms of its environmental performance and therefore an aspect of building services. Number of certified buildings at the end of 2017 was 551. The growth rate of certified buildings compared to 2016 was 66%. The size of the certified area was over 12 million square meters.



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5. Market.

FRP ties, which will be created as a result of the project, will be designed for concrete reinforcement in place of traditional steel ties. The main advantage of FRP ties will be higher strength (no susceptibility to corrosion) and lower weight.

In the case of steel ties, approximately 100 kg of steel reinforcement per 1m³ is required, which must be additionally protected. In the case of FRP ties, approximately 35 kg of reinforcement will be required, which will significantly reduce construction and transportation costs elements.

In Poland, 25 - 27 million m³ of concrete are produced annually, and in Europe no less than 450 million m³. This means high market potential for the product developed in the project.

The product will be highly competitive with both traditional steel ties and those currently offered composite products.

FRP strings are dedicated to the prospective resource-efficient construction market, which is currently. The product is at an early stage of development in Poland, so we should expect growing interest in it in the future.



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6. Team.

Jarosław Małek - born 1972 in Krynica Zdrój civil engineer of building structures, certified carpenter, certified Passive House Master, construction entrepreneur associated for over 7 years with structural reinforcement and composite materials.

Michał Małek - born in 1999 in Krynica Zdrój, production engineering student at the University of Agriculture in Krakow, deals with composite materials trade, online store maintenance and social media. He has the sales competence to implement this project.

Aneta Szymańska - Stachura – born 1981 structural engineer, former academic teacher at the Cracow University of Technology, education: civil engineer, PhD student at the Cracow University of Technology, for many years has been designing structures and structural reinforcements using composite materials. Has the technical competence to implement this project.



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Thank you for your attention!
I invite you to cooperate.

Jarosław Małek



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